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Original Articles.

A CRITICAL DISCUSSION OF SUGAR IN ITS RELATION TO INFANT FEEDING.

By Lewis Webb Hill, M.D., Boston,

Alumni Assistant in Pediatrics, Harvard Medical School.

SYNOPSIS.

Introduction.

I. Physiology.
- Necessity of Sugar to Life.
- Relation of Sugar to Weight and to Retention of Nitrogen and Salts.
- Digestion and Absorption.
- Normal Action of Sugar in the Intestine.
- Assimilation Limits of Different Sugars.

II. Pathology.
- Chemistry of Sugar Fermentation.
- Conditions which Bring About Sugar Fermentation.
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Up to a few years ago the sugar in milk modifications attracted comparatively little attention. It was known that it was a necessary part of the diet, that it furnished calories for the fuel needs of the baby's body, and that, under certain conditions it might cause disturbances of digestion; but in comparison with the other food elements, protein and fat, it was looked upon as relatively harmless. At that time the protein was considered the harmful element, and most of the efforts in modifying milk were concerned with making it easy of digestion. It is natural that this should have been so, inasmuch as perhaps the most striking difference between human and cows' milk is the relatively large amount of protein in the latter. In the last few years the pendulum has swung the other way, largely owing to the influence of Finkelstein and his pupils, who go so far as to teach that sugar is the cause of practically all the digestive and nutritional disturbances of infancy, that fat may cause trouble secondarily, and that protein practically never does any harm. It is unquestionably true that most of Finkelstein's conceptions have been of

great value, and that his work has made an epoch in the science of infant feeding. It is also true that many experienced pediatricians, in the Eastern part of this country, particularly, do not entirely accept his ideas, nor attach so much importance to sugar as a cause of nutritional disorders as he does. It is the purpose of this paper to consider sugar in its relation to the physiology, pathology, and therapeutics of infant feeding, and to attempt to offer a conception of sugar which may, perhaps, help to harmonize certain of the differences between the various methods of infant feeding.

I. PHYSIOLOGY.

Necessity of Sugar. Sugar is necessary to life. A baby may be fed for a long time on a fat-free diet, provided the caloric value of its food and its nitrogen requirement is maintained by adding suitable amounts of the other food elements; but if he is put upon a sugar-free diet, and kept on it for any length of time, he dies from the development of acidosis. Acidosis is produced in this manner in infants much more readily than it is in adults. Therefore, at the outset, let us say that a baby must have in its diet a reasonable amount of sugar (or carbohydrate in some form) if it is to thrive. The exact minimum of sugar necessary for babies of different weights and ages is not known. Sugar is also of great importance as a nitrogen sparer, and seems to have more power in this regard than does an isodynamic amount of fat. When carbohydrate (sugar) is given in the diet it is possible to establish nitrogen equilibrium at a much lower level than when protein alone or when protein and fat alone are ingested. Thomas[1] showed that a diet containing the large amount of 18.4 gm. nitrogen did not suffice to keep the adult body in nitrogen equilibrium when no carbohydrate was given. The reason for this is that the protein food is drawn upon so heavily for fuel in the body that not enough is left for the needs of growth and repair. This holds even more for infants than it does for adults, as the nitrogen needs of infants per kilogram of body weight are considerably greater than those of older persons. The importance of sugar for fuel is shown in breast milk, of which 48.7% of the calories are furnished by the sugar.

Relation of Sugar to Weight and to the Retention of Nitrogen and Salts. The feeding of large amounts of sugar may cause a rapid increase in weight, provided the sugar is well digested. This is partly due to water retention, and high sugar feeding is particularly likely to bring this about because the deposition of glycogen in the body cells, which may be considerable after high sugar feeding, is possible only when accompanied by a retention of two or three times the amount of water. The considerable salt retention with high sugar feeding may also account for a part of the water retention. Thus we see many babies who have been fed on a one-sided high sugar diet, who appear fat, and are perhaps above normal weight. The apparent robust health and weight in these cases is deceptive, because it does not consist of healthy fat and muscle, but of water which has been retained in the body cells. Condensed milk babies are likely to be of this type.

Sugar is not without a good deal of influence upon the retention of the other food elements; up to a certain point, the more sugar that is fed, the greater is the retention of nitrogen and salts, particularly of nitrogen. If the tolerance for sugar is overstepped, and fermentation results, the retention of nitrogen, and especially of salts, may be greatly diminished.

Digestion and Absorption. The sugars used in infant feeding—lactose, sucrose, and dextrin-maltose preparations,—are polysaccharides of complex formula, and must undergo splitting in the intestinal tract before being absorbed. It is probable that sugar is normally acted upon very little in the stomach. It is broken down in the small intestine by the intestinal ferments into two molecules of a monosaccharide, or simpler sugar, and is absorbed as such. The absorption of sugar in health is excellent, and most investigators have been unable to find sugar in the stools of normal babies. Those who have found it have found only very small amounts. In cases where the baby is not absorbing sugar well, it is broken down into acid end-products, by bacterial action, and thus, even in sugar indigestion, it is not usual to find sugar in the stools.

Normal Action of Sugar in the Intestine. The stools of a breast-fed baby are normally quite strongly acid in reaction, due to the large amount of sugar and fat in breast milk. There is always normally a certain amount of sugar fermentation going on in the intestine of a breast-fed baby, caused by the nor-

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bifidus and acidophilus acid-producing flora, which does not appear without sugar. Normally, in the breast-fed baby's intestine there is fermentation going on; normally, in the bottle-fed baby's intestine, putrefaction is likely to exist, on account of the relatively large amount of protein in most cows' milk modifications. This calls forth a different sort of intestinal flora from that of the breast-fed baby, and we do not see the pure acidophilus and bifidus flora that we do in the former. In the bottle-fed baby there is hardly any normal standard of stool acidity or of intestinal flora to go by, as the intestinal processes depend so much upon variations in the food supply, but stools of the same acidity as those normal for the breast baby would be quite abnormal for the bottle baby, and would be due to pathological, and not physiological, fermentative processes. The reason that a breast baby can stand such high acidity of the stools is that the fermentation is going on in the large intestine, and the peristalsis and digestive functions of the small intestine are, therefore, not interfered with. In the bottle-fed baby with very acid stools, or in the breast baby with excessive sugar fermentation, there is an increased bacterial content of the small intestine from various causes, favoring abnormal fermentation there. An important point to remember is that there are always two antagonistic processes going on in the bottle-fed baby's intestine: breaking down of protein, which tends to cause an alkaline reaction in the intestine, partly from the alkaline end-products that are formed, partly from the large amount of alkaline pancreatic juice which is thrown into the intestine in order to digest the protein. The opposite process consists in a breaking down of sugar and, secondarily, of fat, with acid end-products. In a normal bottle baby, whose food is agreeing with him, these two processes just about balance one another; if one greatly predominates, trouble results, due to a too acid or too alkaline reaction in the intestine. The processes of digestion and of absorption are very delicately adjusted with regard to the intestinal reaction, and must have a certain optimum reaction in order to proceed efficiently; comparatively slight changes in acidity or alkalinity may serve to upset these carefully adjusted processes. The breaking down of protein is caused by one group of bacteria, that of sugar by another group, and the bacteriology of the intestine, and thus the reaction, can be very largely controlled by the type of food offered. A food high in protein will call forth groups of bacteria that live upon protein, and hence an alkaline intestine; a food high in sugar will call forth bacteria that live upon sugar, hence an acid intestine. We cannot separate bacteriology and problems of digestion and absorption: bacteria *always* play an important rôle in the interaction between the various food elements in the intestine. The pediatrician can control the type of stools, and make the intestine acid or alkaline at will, according to the type of food he offers to the baby, according to the amounts of the food elements in his mixture, and most particularly according to the *relation* between these food elements. It is vital for the baby to have a well-balanced food, and no one element can be considered apart from its relation to the other food elements.

These principles are, I believe, of great importance in practical feeding.

Assimilation Limit of Different Sugars. A baby takes relatively much more sugar than does an adult, and the assimilation limit is much higher in infancy than it is in later life. A breast-fed baby of 4 kgm.[2] would take, perhaps, 120 gm. of milk at a feeding, containing, roughly, 8.4 gm. of lactose, or 2.1 gm. per kgm. body weight. An adult usually shows sugar in the urine after taking about 1 gm. sugar per kgm. body weight. Practically speaking, it is difficult to exceed the assimilation limit of a baby before sugar fermentation and diarrhea occur. The assimilation limits of the different sugars vary somewhat, that of lactose and sucrose being about the same, from 3.1 to 3.6 gm. per kgm. body weight, that of maltose considerably higher, about 7 gm.

II. PATHOLOGY.

Chemistry of Sugar Fermentation. It is now generally granted that bacterial fermentation of sugar in the intestine plays a very important part in digestive and nutritional disturbances. A number of different agencies may bring this about, but the end-result is the same: excess of acid from the breaking down of the sugar, with consequent irritation of the intestinal mucous membrane. The production of acid is the first step in the chain of proc-

esses which may occur, and which may produce mild or severe conditions in the baby, depending upon how far they are allowed to go. I believe it is fair to say that the unchanged sugar molecule is without influence, and that it must be broken down into volatile acids before harmful results are brought about. This breaking down is done by the action of bacteria upon sugar, and the probability is that it cannot be done in any other way.

Let us consider for a moment the chemistry of sugar fermentation, and the products that are formed. Lactose is a polysaccharide, a rather complex chemical substance, with the formula $C_{12}H_{22}O_{11}$, containing many carboxyl and some aldehyde groups which may be very readily changed over into acid radicals. It will be seen from this that there is possibility for the formation of a considerable number of end-products when the molecule is torn apart, and that from the chemical constitution of sugar acids are the substances which are most likely to be formed. Two different groups of acids may result from the breaking down of sugar: the so-called volatile "fatty" acids and the non-volatile acids. The non-volatile acids are lactic and succinic acids and probably do no harm. It is the volatile fatty acids with which we are concerned. There are thirteen members in this acid series, as follows:

NAME*	FORMULA
Formic acid	$HCOOH$
Acetic	CH_3COOH
Propionic	$C_2H_6O_2$
Butyric	$C_4H_8O_2$
Valeric	$C_5H_{10}O_2$
Caproic	$C_6H_{12}O_2$
Heptylic	$C_7H_{14}O_2$
Caprylic	$C_8H_{16}O_2$
Nonylic	$C_9H_{18}O_2$
Capric	$C_{10}H_{20}O_2$
Palmitic	$C_{16}H_{32}O_2$
Margaric	$C_{17}H_{34}O_2$
Stearic	$C_{18}H_{36}O_2$

* Text-book of Organic Chemistry, Holleman.

The lower members are liquids; the higher ones, beginning with C_{10}, are solids at ordinary temperature. It is the lower members of the group which are most important, and it is unlikely that the higher ones are formed by the breaking down of sugar. The higher acids are formed by the breaking down of fat, and it is also theoretically possible that the lower acids (formic, acetic) may be likewise formed from fat destruction. Probably always when there is a fermentation of sugar going on in the intestine, there is also a secondary fermentation of fat, and it is quite impossible to tell how much of the acid formed comes from the one, how much from the other. The modern German school is inclined to attach very little importance to fat fermentation: they believe that it is practically always secondary to sugar fermentation, and does little harm. Salge, in his important monograph in 1906, believed, however, that *all* the trouble came from the fat, and none from the sugar. Chemically, both substances can form acids very easily, and it is probable that in many cases the sugar and the fat *both* play an important part.

Bokai[3] found that the acids were irritating to the intestine in the following order: caprylic, capronic, acetic, propionic, formic, butyric, valeric. Bahrdt and Bamberg[4] believe that acetic is the most irritating. Increased amounts of volatile fatty acids in the intestine may bring about the following harmful changes:

1. Increase peristalsis by irritating the intestine, with diarrheal stools as a result; these loose stools may carry out a good deal of undigested fat and protein which have not had time for absorption.

2. Injure the mucous membrane of the small intestine in such a way that it is unable to exert its normal anti-bacterial powers. Also, the functionally injured mucous membrane may allow the passage of harmful substances (lactose?, salts, acids, or bacterial endotoxins) into the system, which would not be able to pass the healthy intestine. This may lead to severe intoxication.

3. Draw upon the alkali reserve of the body in an attempt to neutralize the excessive acidity. This may help to cause an acidosis.

4. Upset the normal chemical processes of digestion, most of which cannot go on satisfactorily in an excessively acid intestine.

CONDITIONS WHICH MAY BRING ABOUT SUGAR FERMENTATION.

Two things are necessary for sugar fermentation: undigested sugar free in the intestine, and bacteria in sufficient quantity to attack it. It must be remembered that there is no specific bacterium which accomplishes this: it may be done by a number of different organisms, either the normal inhabitants of the intestine, or harmful organisms introduced from without. The place of fermentation is of a good

deal of importance. The small intestine is relatively sterile, partly from the antiseptic action of the hydrochloric acid of the stomach (upper portion), partly from the antibacterial action of the intestinal juices, and partly from the antibacterial action of the intestinal epithelial cells. The large intestine, on the other hand, is swarming with bacteria, and any conditions which allow these to migrate to the small intestine and flourish there favor sugar fermentation. In the breast-fed baby, sugar fermentation usually means simply that a certain portion of the large amount of sugar in breast milk has passed on undigested to the large intestine, and the acid reaction which is caused there by its fermentation is a physiological condition, which promotes proper peristalsis and evacuation of the bowel. In many bottle-fed babies with moderately acid stools such is also likely to be the case, but in the majority of bottle babies with loose acid stools the fermentation is proceeding in the small intestine, and is abnormal. A difficult problem in artificial feeding is to keep down excessive intestinal putrefaction with the formation of constipated alkaline calcium soap stools, without going to the extreme of excessive acid sugar fermentation. These two conditions are largely controlled by the relation between the different food elements in the mixture offered to the baby.

A. BACTERIA INTRODUCED FROM WITHOUT IN BAD MILK.

It is a well-known clinical fact that most cases of fermentative diarrhea are seen in the summer months, when milk has a greater chance to spoil than in the cold weather, and in babies who do not receive the best milk supply. I believe that more cases of fermentative diarrhea are caused in this way than in any other. The German school, however, considers this cause relatively unimportant, which is, perhaps, explained by the fact that they always feed their babies on a practically sterile, boiled milk. One of the greatest problems before pediatricians always has been to strive for the production of clean milk, and the causal relationship between so-called "summer diarrhea" and bacterial infection of milk was recognized long before any such thing as sugar fermentation was heard of. Different authors have described different specific bacteria which cause the trouble, but I believe it probable that almost any bacterium when present in sufficient quantity in the milk may bring it about. It is probable that spoiled milk plus heat is more likely to cause trouble for the baby than is spoiled milk alone. Bahrdt[5] and his co-workers investigated the following question: "Is the number and kind of bacteria in the stomach and intestine, as well as the number and kinds of fatty acids formed, dependent upon the bacterial infection of milk before ingestion"? They fed dogs on milk infected with many different sorts of bacteria, killed the dogs two hours after feeding, examined the stomach and intestinal contents, and found, that in spite of the large intake of bacteria, there was not a large bacterial increase in the stomach and intestinal contents, due, they believed, to the strong anti-bacterial powers of the normal stomach and small intestine. They conclude that milk infection is not a very great factor in the common (non-epidemic) diarrheas of children, and believe that the influence of food infection, plus heat and over-feeding is necessary to cause trouble in most cases. Such investigations as these are, of course, very artificial, and, while valuable, are by no means conclusive.

B. CONDITIONS UNDER WHICH THE NORMAL BACTERIA OF THE INTESTINE MAY CAUSE SUGAR FERMENTATION.

1. *Overfeeding.* Overfeeding with sugar, either given as too much food as a whole or as a too high sugar percentage, may cause fermentation. The excess of sugar cannot be absorbed before the intestinal bacteria attack it. Part of the sugar is probably fermented in the small intestine; part in the large, and oftentimes such a condition may be quickly relieved by simply cutting down the amount of sugar in the diet. This is the simpest condition of sugar fermentation and depends alone upon the excess sugar that is present and the bacteria, without the salts, spoiled milk, or heat, entering into the question at all. The next five types of sugar fermentation depend fundamentally upon changed processes in the small intestine; either a diminished anti-bacterial power, or a diminished secretion of digestive juices, from several causes.

2. *High Sugar in Combination with High Salts.* The German school has contended that perhaps the most important cause of sugar

fermentation is a depression of the anti-bacterial powers of the epithelial cells of the small intestine by the salts of the cow's milk—particularly those salts which are left behind in the whey after the curd has formed. This lowering of resistance allows bacteria to flourish in the small intestine, where they would not normally. We know that the small intestine does have considerable anti-bacterial power; whether this is dependent upon some peculiar property of the epithelial cells, or whether it depends upon the intestinal juices, is not certain. The importance that the German school ascribes to the whey salts is based largely upon Meyer's classical investigation, in which he separated breast milk and cows' milk each into curds and whey, and then added the whey of breast milk to the curds of cows' milk, and vice versa. He found that the mixture containing the cows' whey caused diarrhea when fed in conjunction with a high sugar; those containing the whey of breast milk did not.

There is no question but that cows' whey is rich in salts. It contains about .80 to .90% salts, in the form of the chlorides, citrates and phosphates of sodium, potassium and calcium. About half of the calcium of the original milk is present in the whey, probably nearly all of the sodium and potassium.[6] There is a certain amount of evidence to show that strong solutions of salts may depress the functions of living cells, but the salt concentration of cow's whey, although higher than that of human whey, corresponds to a physiological saline solution only. It is hard to see how a concentration of salts which is thus practically isotonic with the body fluids, can act in an injurious manner to the intestinal cells. Again, we know that plain whey, undiluted, is usually borne very well by even the smallest babies, and often is fed to them with great success during gastro-intestinal disturbances of various sorts, when the casein and fat of cow's milk, perhaps, cannot be borne at all. Also when we add sodium citrate in the strength of one or two grains to the ounce of milk and cream in the mixture, to modifications to favor the digestion of the protein, we are adding a large amount of sodium and of citrate ions, which does not seem to upset the baby. Again, when we add calcium chloride to a baby's milk in order to lessen nervous irritability in spasmophilia, we add much more than is ever present in whey. Neither does this ordinarily upset the baby.

One of the chief purposes of the famous "eiweiss milk" was to dilute the whey salts, but in eiweiss milk we have all the salts of the buttermilk used in its preparation, which, in the finished eiweiss milk would correspond approximately to a salt concentration obtained by dilution of cow's milk one-half with water. "Eiweiss" milk works; there is no question of that; but may not its beneficial effect be due rather to a very low sugar content (1.5%) than to a low salt content, which it does not contain? Let us suppose a baby was having dyspepsia on a dilution of one-half milk with added sugar; we would feed him eiweiss milk, and it would probably arrest the sugar fermentation, but we would not have decreased the salt content of his food at all.

The work of Courtney and Fales,[7] under the direction of Dr. Holt, is interesting in this connection.

"Protein milk contains a higher ash, and higher amount of all the different salts than are ordinarily given to infants artificially fed. As compared with woman's milk, not only are the total salts of the ash in great excess, but the amount of calcium is nearly five times and the phosphorus nearly seven times as great. The soluble salts, also, are nearly twice as abundant in protein milk as in human milk. As used at the Babies' Hospital extensively for three years with most satisfactory results, eiweiss milk has contained, owing to the addition of sodium chloride to the buttermilk used, an amount of Na and Cl nearly as great as in undiluted cow's milk, and much greater than in woman's milk. The following table shows the salt content in percentages of protein, cow, and human milk."

	Total Ash	Ca O	Mg O	P_2O_5	K_2O	Na_2O	Cl
Protein	.648	.201	.021	.222	.109	.032	.061
Cow ..	.743	.176	.020	.206	.189	.050	.111
Human	.206	.047	.008	.034	.057	.014	.035

It can be seen from these few suggestions, that the question of the harmfulness of the whey salts is not at all a clear one, and that Meyer's original suppositions can be by no means unconditionally accepted. There is no question but that breast milk, even with its high sugar content, can often be fed with beneficial results to babies who are suffering from sugar fermentation. Sugar fermentation must, therefore, be due in these cases to

sugar plus some indeterminate factor, present in cow's milk, and not present in breast milk. There is evidently some property of breast milk which allows its high sugar content to be handled by the baby without undue fermentation; whether this is due to the relatively low salt content of breast milk, or to other factors, is not certain.

3. *Overheating of the Baby's Body.* Overheating is of great importance in bringing about sugar fermentation. It is generally recognized that in adults not so much food can be tolerated in very hot as in colder weather, and the same applies to babies. Meadowikow's[8] researches are of interest in this connection. He found that with dogs kept in a hot room there was a very greatly increased bacterial growth in the small intestine, and actually found bacteria in various organs at autopsy, where they were not found in control dogs. Besides diminishing the anti-bacterial powers of the intestine, he believes that heat may so depress the vitality of the intestinal epithelial cells that bacteria may actually pass through them into the tissues. It is also likely that the digestive juices of the intestine under the influence of heat are decreased in amount and in functional powers, so that not as large quantities of sugar can be digested as under normal conditions. What is undigested ferments readily.

It is hard to separate the influence of heat from other influences, but all clinical writers are agreed that excessive heat, particularly caused by overclothing in the hot weather, is a very important cause of sugar fermentation.

4. *"Parenteral" Infections.* Infections of various sorts in other parts of the body than the digestive tract are important as a cause of sugar fermentation. This has been noticed by American pediatricians for years, but has received much more attention from German writers than it has from those in this country, and it is my belief that followers of the German school are, perhaps, too prone to ascribe sugar fermentation to "parenteral" infection, as it is called. There is no question, however, but that many babies with otitis media, nasopharyngitis, etc., will show evidences of sugar indigestion by loose, green, acid movements, when their movements previous to the onset of infection may have been quite normal. This is an important group of cases, and I believe that many of us in this country have gone to the other extreme, and have not realized how important and how frequent this cause of sugar fermentation is. Clinically, the diarrhea is usually not severe, and the baby is likely to have merely six or seven loose, greenish, acid stools a day, without evidences of prostration or toxemia. The explanation is probably that in any infection the digestive juices are partly suppressed, so that undigested sugar can proceed lower than is normal down the digestive tract, where the ever ready bacteria there attack it; or again, that suppression of the antibacterial powers of the small intestine from the general lowering of vitality may allow these same bacteria to flourish higher in the gut than they normally would.

5. *Nervous Influences.* Nervous exhaustion and excitement may also bring about sugar fermentation by suppressing the secretion of the intestinal juices, and possibly by increasing intestinal peristalsis, in which case time is not given for the proper digestion of the sugar in the small intestine, and it proceeds to the large intestine, where it ferments. This is a relatively mild and unimportant form of sugar fermentation.

6. *Constitutional Weakness.* As a last and important cause of sugar fermentation, constitutional weakness of the baby is to be considered. In these cases the tolerance is likely to be weak for every food element. The antibacterial forces of the small intestine are not powerful enough to keep down bacterial growth the way they should, and bacteria flourish where they normally should not. The functions of the intestinal epithelium are easily disturbed by forces which would have no influence upon a more vigorous child. The sugar-digesting juices are also deficient, and with the abnormal bacterial growth and poor digestive power of the intestine, ideal conditions for sugar fermentation are at hand. This group of cases comprises those babies whom we are accustomed to class under the head of chronic sugar indigestion rather than as acute. Any overstepping of their rather meager tolerance is practically sure to result in a sugar diarrhea.

CLINICAL APPEARANCES OF MILD AND OF SEVERE CASES OF SUGAR FERMENTATION.

The mild and the severe cases of sugar fermentation we are accustomed to call "mild"

or "severe" cases of fermental diarrhea, or of indigestion with fermentation. The Germans call the mild cases "dyspepsia," the severe ones "intoxication."

The clinical appearance of the mild and of the severe cases is considerably different.

Mild Cases. The baby has usually from four to ten loose, green, acid stools a day. His appetite is impaired, he is fussy and restless, and is obviously moderately but not severely sick. The temperature is slightly elevated, usually 99° to 100.5°. The respiration is of normal character, the tissues are still firm and hard, and there is either stationary weight, or perhaps a slight loss. The outlook is good, and the baby will in most cases respond readily in a few days to proper treatment.

Severe Cases. The severe cases present a quite different picture, which has been very well described by Dr. Gerstley of Chicago.

"The child is very feverish and lies in semi-stupor. The sunken cheeks, the sharp nose, the ashen, mud-colored, wrinkled skin, the cold extremities—all show great loss of weight and prostration. Intense watery diarrhea drains the body of its food, pulls out the very building-blocks of the tissues. The pulse is rapid and weak. Lying apathetically, the baby takes not a particle of interest in his surroundings. The unclosed lids show the glassy eyes fixed unintelligently upon a corner of the room. Occasionally he wakes for a moment, looks at us, cries fretfully, and wanders off into apathy. The breathing is characteristic; deep and sighing, like the air hunger of diabetic coma. Occasionally one of the limp extremities moves slightly; sometimes it takes a cataleptic attitude. The urine may show sugar, albumin and casts."

Metabolism. The metabolism in the two groups of cases is quite different. In the mild cases the disturbance is a local intestinal affair and, practically speaking, its influences do not extend beyond the digestive tract. The sugar in the intestine is fermented by bacteria, and the resulting acid end-products irritate the intestinal mucous membrane and cause a diarrhea. The chemical processes in the intestine are considerably changed, but there is no profound and far-reaching change in the chemistry of the whole body, as there is in the more severe cases. There is a moderately diminished absorption of all the food elements, partly due to increased peristalsis, partly to the altered chemistry of the intestine. The absorption of ash is particularly poor, although the diminished absorption of nitrogen and of some of the ash constituents seems to be partly compensated for by a somewhat increased retention.[9]

There is probably very little absorption of injurious products into the general circulation, and the metabolism of the baby as a whole is not seriously affected. The intestinal mucous membrane is irritated, but is still functionally efficient enough to prevent toxic substances from being absorbed through it. The stools are so acid that considerably more of the alkali excreted from the body goes out in the stool than normally, but not enough alkali is withdrawn to cause severe acidosis. In the severe cases (intoxication) the situation is quite different. The process which has started locally in the intestine, has spread its effects all through the body, so that the chemistry of the baby's body cells is completely upset. In the beginning, the sugar is fermented, and acids are formed as in the mild cases, but the process continues so long or with such a degree of intensity that the intestinal mucous membrane is severely injured, not anatomically, but functionally, and allows substances to pass through into the general circulation, which it would never allow under normal conditions.

All investigators are agreed up to this point: that the acids formed depress the function of the intestinal epithelial cells in such a way that toxic substances are allowed to pass into the circulation. But there has been considerable disagreement as to what the nature of these substances or substance is.

Five things may be considered:

1. Lactose.
2. Salts.
3. Food decomposition products.
4. Bacteria.
5. Bacterial decomposition products (endotoxins).

1. Lactose.

Finkelstein originally believed that lactose unchanged was the toxic agent. This view originated because it was noted that in nearly all cases of "intoxication," sugar was found in the urine.

Meyer[10] found sugar in the urine in every urine of 150 cases of intoxication, and regarded

it as one of the earliest symptoms of the toxic state. The sugar was lactose, and was usually in a concentration of about 1%. The specific toxic effect of lactose is denied now by Finkelstein himself, as well as by other observers (see Allen: "Glycosuria," etc.), and the lactosuria is looked upon as a symptom of the toxic state rather than the cause of it.

2. Salts. The next substance that attracted attention as a cause of fever were the salts, and Finkelstein, as well as many of his followers, adheres to this view. Much has been written about "salt fever," and many authors claim to have produced fever by injecting subcutaneously sterile solutions of various salts, particularly sodium chloride. Other investigators believe, however, that the fever is caused by the bodies or endotoxins of dead bacteria in the water, and that if sterile distilled water be used, no fever results. There are a number of objections to the theory of salt fever, not the least of which is that subcutaneous injections of normal saline are one of the most efficient means of combating some of the most severe cases of "intoxication." And indeed, Langstein and Meyer, in their book on infant nutrition, advocate this as a method of treatment, also sodium chloride solutions by rectum, despite the fact that they assert that the salts, particularly sodium chloride, are important in depressing the anti-bacterial function of the intestinal epithelium, and that, when they are absorbed, they are extremely toxic and pyrogenetic. Without further discussion, I believe it is fair to say that it has never been shown conclusively that the salts are to be regarded as the cause of the toxic state, and that at the present time the theory of "salt fever" has few adherents.

3. Products of Food Decomposition.

The acids that are formed from sugar fermentation have also been taken into consideration as the toxic agents. It is true that these acids are to a certain extent absorbed, but they are almost completely burned in the body, and in the urine rarely occur, or if they do, only in the smallest traces. It is probable that they have little to do with causing fever, but may play a small part in causing the acidosis, which is a part of the symptom complex.

4. Bacteria.

It is conceivable that the intestinal mucous membrane may allow bacteria to pass through it into the circulation, and that these bacteria are the cause of the fever. This possibility is not at all likely, although there is some evidence to show that it may occur. Blood cultures from cases of "intoxication" have not shown that there is any demonstrable growth in the blood, and the bacteria which inhabit the intestine and cause fermentation are mainly saprophytes, and have little tendency to invade the body tissues. In true infectious diarrhea, caused by the dysentery bacillus we know, on the other hand, that infection of the blood is not at all an uncommon occurrence.

5. Tobler[11] believes that absorption of bacterial endotoxins is the most important cause of the fever, and of most of the toxic symptoms. This seems the most reasonable explanation. In the intestinal tract, during processes of sugar fermentation, there is an enormous increase in the number of bacteria present. Millions of bacteria are being destroyed every moment, and countless new ones are appearing.. Why is it not reasonable to suppose that the soluble toxins from the disintegrated bodies of dead bacteria are the substances that cause fever? We can thus liken the fever to other familiar fevers which are caused by absorption of bacterial toxins from other parts of the body. Why should we look to salts and lactose, when there is present a much more reasonable and probable source of fever?

Acidosis. It had been noticed for some years that the severe cases of sugar fermentation had the hyperpneic type of breathing: deep, sighing, tireless respiration—and that the worse the case, the more marked was the hyperpnea. Howland and Marriott[12] have investigated this extensively, and have shown that many of the severe cases have a considerable amount of acidosis, and that acidosis accounts for the hyperpnea, and probably also, in combination with the other factors already discussed, for the toxic condition. It is likely that a good many babies who die from "alimentary intoxication" really die from acidosis. The acidosis may be produced by a number of factors. Acidosis, in general, may be produced in three ways:

1. Increased acid production within the body, by the breaking down of body fat.
2. Increased alkali loss.
3. Decreased acid elimination.

In severe conditions of sugar fermentation

the acidosis is probably produced by a combination of all three factors. The baby is taking little food, hence his body fat is broken down. Also, as mentioned before, there is in "intoxication" a negative alkali balance, caused largely by a considerable withdrawal of the alkali reserve of the body in an attempt to neutralize the acid condition in the intestine. Lastly, the kidneys are as a rule very inactive in intoxication, and it has been recently demonstrated by Schloss[13] that there may be a considerable impairment of kidney function, as shown by various functional tests. This leads to a retention of acid sodium phosphate, which may be considerable, and which Howland and Marriott believe to be probably the most important factor in producing acidosis.

SUMMARY.

In the severe cases of sugar fermentation there is a fairly distinct clinical picture present which has been called alimentary intoxication. It is a condition arising primarily from the digestive tract, but in its fully developed state it is no longer confined to the intestine, and the entire chemistry of the body is upset. Several views have been advanced to explain the fever, the most reasonable of which is that it is due to the absorption of bacterial toxins. The fever, however, is only a part of the picture; acidosis, a diminished fluidity of the tissues, retention of toxic waste products, and a negative salt and nitrogen balance play important rôles. It is thus impossible to ascribe the toxic state to the influence of one factor alone; several are involved, and each plays its part.

III. THERAPY.

What Sugar to Feed to Normal and Abnormal Babies. Inasmuch as lactose is the natural sugar which a baby gets in breast milk, it seems only reasonable to use this in feeding normal babies. There is no good reason for feeding *normal* babies on any other sort of sugar. If the baby has a tendency to sugar fermentation, with rather frequent and loose stools, it is better to use one of the maltose-dextrins preparations, as these ferment less easily than does lactose. On the other hand, if the baby is having hard, soapy, alkaline stools, lactose is to be preferred, as it promotes normal fermentative processes in the intestine, and does away with the constipation. In this type of case large amounts of lactose can sometimes be fed without harm. The constipated, soapy type of stools is especially likely to be seen, I believe, in babies who are fed on dextri-maltose in combination with rather a high protein percentage. There is not enough fermentation of the sugar to promote the normal peristaltic processes, and to make an acid intestine. An alkaline intestine favors calcium soap formation and constipation. Often the addition of one of the liquid malt extract preparations will correct this type of constipation, or lactose may be added to the dextri-maltose already in the mixture, and increased until looser movements result. If, for one reason or another it becomes necessary to feed an unusually large amount of sugar, it is best not to use lactose, as there is less risk of upsetting a baby with large amounts of a maltose-dextrins preparation than with equal amounts of lactose. It must be remembered, however, that maltose is not a specific for all sugar troubles, and that certain babies do not do at all well on it. Sucrose has as its only advantage that it is cheaper than any of the other sugars, and it is well not to use it unless for financial reasons, as it is not a good plan to have a baby develop a sweet taste. Sucrose seems to ferment with about the same readiness that lactose does.

Amount of Sugar to be Fed. Practically speaking, it is very difficult to exceed the sugar assimilation limits of a baby, because almost always vomiting or diarrhea result before this stage is reached. Babies vary immensely in the amount of sugar that they can take. The usual rule is not to exceed 7.00% of sugar in the formula, and in general this is a good rule to follow, but may often be broken with advantage. There are many babies who cannot digest fat well, some who cannot digest protein well, and in these cases the sugar digestion is often very good, and a large amount of sugar may be fed without causing any disturbance. This is a truth that we often do not realize in difficult feeding cases. In babies with loose bowels the sugar cannot usually be much increased, but in a certain type of baby who does not gain, who does not digest fat, and who has constipated stools, a large amount of sugar can be fed with perfect safety. I have in mind a baby six months old who cannot take over 1.25% of protein without diarrhea and vomiting, and who never could be made to gain until she was

put upon 10% of sugar, partly as maltose, partly as lactose. There are a good many babies of this type, I believe, and high sugar feeding seems to send them ahead faster than anything else. The nitrogen needs must be covered, of course, and the minimum of protein necessary for this should be given. Ordinarily in these cases one of the maltose-dextrins preparations is the best sort of sugar to use.

The relation between the sugar and the other food elements, particularly the fat, is important. A very high sugar should never be offered in conjunction with a high fat. It is possible many times to feed a high sugar with a high protein, but in general, if the sugar is to be varied it is best to keep the other food elements low. In certain difficult feeding cases I am in the habit of having the baby's formula made up with perhaps 6 or 7% of sugar and then instructing the mother to add one, or later, perhaps two teaspoonfuls of sugar to each feeding. In this way the baby's sugar tolerance may be tested, and the sugar can be pushed to just under the limit. It is quite surprising to see how well some babies will do on this high sugar feeding, and how rapidly they will gain. They must be kept under close observation, however, for sugar diarrhea may occur at any time. The work of Dunn and Porter[14] is interesting in this connection. They fed a number of babies on high sugar percentages, in many cases as high as 15 or 18%, and as a result of these studies arrived at the following conclusions: "It seems to us that the idea of sugar injuries and sugar intoxication has possibly kept us from the use of large amounts of soluble carbohydrate in certain cases, particularly those unable to take a quantity of fat sufficient to meet their nutritive requirements. That many such babies have intolerance for sugar, is undoubtedly true. But the danger of pushing the sugar to the limit of tolerance we believe to have been exaggerated. The signs of sugar indigestion are distinct and easily recognized, and do not appear to be in any way serious. In many cases great benefit appears to be obtained by greatly increasing the carbohydrate content of the food, and this proceeding may prove a valuable addition to our stock of resources in dealing with difficult feeding cases."

Calculation of Sugar. In calculating the required amount of sugar to add to a mixture to secure a given sugar percentage, one of two methods may be used. The weight of the sugar may be calculated in relation to the amount of the total mixture, remembering that two rounded tablespoonfuls of lactose weigh about an ounce. Then, if we wanted to add, let us say 3.00% of lactose to a thirty-two ounce mixture,

3/100 of 32 oz. = 1.00 (approx.) = 1 oz., or 2 *rounded* tablespoons.

The next method consists in the use of a table.

One *level* tablespoon of sugar raises the sugar percentage
2.40% in a 16 ounce mixture
2.00% in a 20 ounce mixture
1.60% in a 24 ounce mixture
1.20% in a 32 ounce mixture
1.00% in a 40 ounce mixture
.95% in a 42 ounce mixture
.80% in a 48 ounce mixture

Weights and Measures.
3 level teaspoons=1 level tablespoon
2 level tablespoons=1 large kitchen spoon

Cane sugar is considerably heavier than lactose or the dextri-maltose preparations, and this should be taken into consideration in using it.

	Cane Sugar	Lactose	Dextri-Maltose
1 level tablespoon =	15 gm.	—10 gm.	—9 gm.
1 rounded tablespoon =	25 gm.	15 gm.	14 gm.

Maltose-Dextrins Preparations. In the last few years, numerous maltose-dextrins preparations have been put upon the market. Most of the proprietary foods contain large amounts of dextrins and maltose, but the preparations referred to below should hardly be classed as proprietary foods, as no extravagant claims are made for them, and it is recognized that none of them are complete *foods,* and should be used simply as sugars, when the addition of a maltose-dextrins preparation to the mixture is indicated for any reason. The maltose-dextrins preparations are made from potato, barley or wheat starch by the action of the diastatic malt ferment. The starch is first broken down into a mixture of various dextrins, and as the process continues some of these dextrins are further broken down into maltose. Pure maltose is never used in infant feeding; it is a chemical curiosity, very expensive and difficult to prepare, and is said also to cause a severe diarrhea, not from its fermentation, but from its own irritating action. So when we ordinarily speak of feeding a baby on maltose, we mean a mixture of maltose and dextrins. The

maltose-dextrins preparations on the market vary considerably in their composition: some contain a larger amount of maltose than of dextrins; some the reverse.

It is important to bear in mind that they cannot be used interchangeably, as some of them act much differently from others. In general, the preparations that contain large amounts of dextrins are rather constipating in their action, on account of the fact that dextrins are broken down and absorbed so slowly. These preparations may often be advantageously combined with lactose in the formula, and if constipation exists, 2 or 3% of added lactose will usually correct it. The preparations that contain a large amount of maltose are, on the other hand, quite laxative in action, and sometimes a most excellent method of treating constipation in babies is to add one or two teaspoonfuls of one of the liquid malt extracts to each feeding. The important thing in dealing with most cases of constipation is to have a proper understanding of the use of the various sugars. A list of some of the maltose-dextrins preparations follows, with their percentage compositions.

MEADE'S DEXTRI-MALTOSE No. 1.	D.-M. No. 2.	D.-M. No. 3.
Maltose 52%	Maltose. 53%	Maltose 52%
Dextrins ... 41%	Dextrins 42%	Dextrins ... 41%
Sodium chloride 2%		Potassium carbonate. 2%

HORLICK'S FOOD	HORLICK'S "DIASTOID"
Maltose 64%	Maltose 73%
Dextrins 17%	Dextrins 11%
Protein 12%	
Fat 1.4%	

BORCHERDT'S MALT SOUP EXTRACT*	BORCHERDT'S DRI-MALT SOUP EXTRACT
Maltose 57%	Maltose 71%
Dextrins 12%	Dextrins 13%
Protein 6%	Protein 9%
Potassium carbonate 1.1%	

"MALTINE" MALT SOUP EXTRACT*	MELLIN'S FOOD
Maltose 62%	Maltose 58%
Dextrins 3%	Dextrins ... 20%
	Protein 10%
	Fat ..... .16%
	Potassium bicarbonate. 2.5%

* A liquid of the consistency of very thick molasses.

The liquid maltose preparations are very laxative in action, and not more than 2% should ever be added to a mixture. Also, it must be remembered, in using the liquid preparations, that they contain a good deal of water, and allowances must be made accordingly in calculation.

TREATMENT OF MILD AND OF SEVERE CASES OF SUGAR FERMENTATION.

The treatment of these conditions is of very great importance, as often by proper treatment life may be saved, and with improper treatment the case may be changed from a mild to a severe one, and death may result. Many cases of mild sugar fermentation may be controlled by simply diluting the food for a few days or by omitting all added sugar. If the case is a mild one it may not be necessary to go further than this. The more severe cases will require further treatment, which may be discussed under the following heads:

1. Purgation.
2. Food.
3. Water.
4. Alkali.
5. Intestinal irrigations.
6. Drugs.

1. It is a routine with many practitioners to give castor oil or calomel to any baby with diarrhea the first time they see him. This is often a grave error. It is true that it is desirable to empty the intestine, but if the baby is having ten or fifteen loose stools a day he is emptying himself as fast as he possibly can, and to give a purge to such a baby is simply to irritate and to make functionally weaker an already irritated and weakened intestinal mucous membrane. If the baby is having fewer stools, and particularly if he is seen at the very onset of his illness, a purge is by all means desirable. Personally, I prefer castor oil, and this is the purge used almost universally in this part of the country. In the South, however, where there is an enormous amount of infantile diarrhea of various sorts, I have rarely seen castor oil used. Calomel takes its place, and it is often true that a baby who has an irritable stomach will keep down calomel better than he will oil. Calomel also is of service occasionally in controlling vomiting when it is due to reversed peristalsis. As an intestinal antiseptic it should not be used, and there is a certain amount of evidence to show that there may actually be a greater bacterial growth in the intestine when calomel is given than when

it is not. The initial purge should not be repeated, and I believe it a great mistake to give a daily purge, a practice which is not at all uncommon. In the mild cases it is not necessary to starve, and many times the mildest ones will respond to a simple dilution of the food for a day or two. Cases slightly more severe may be put on special food (see below) without a preliminary starvation, but the really severe cases with toxic symptoms must have the intestine thoroughly emptied by starvation for about twenty-four hours. During the period of starvation nothing should be given but water or weak tea, and this should be forced in order to supply the child with fluid.

2. *Food.*

Principles of Feeding. Inasmuch as the condition that we are dealing with is a fermentation of sugar, the chief principle to bear in mind is to feed a low percentage of sugar. Since there is often a secondary fermentation of fat, it is usually desirable to reduce somewhat the fat in the food offered. A high protein in an easily assimilable form in combination with a low sugar and a fairly low fat gives us a food which will stop excessive fermentation by withdrawing the fermentable substance, and also by tending to produce an alkaline intestine instead of an acid one. An alkaline intestine containing little sugar also favors the formation of solid soapy stools, a condition which is desirable, as in this way the diarrhea is controlled. Small amounts of food should be offered at first as the food tolerance for every element is much lowered.

Details of Feeding. Any milk modification which is put together on these principles is a suitable food upon which to feed cases of sugar fermentation. The exact method to be used will vary somewhat according to whether the baby is to be fed on a home modification or from a milk laboratory.

HOME MODIFICATION.

1. *Skim Milk Mixtures.*

In much of our out-patient work it is impossible to prescribe complicated formulae, for home modification, as the intelligence of the patients and the conditions of the home are incompatible with any procedure which is not very easily explained and understood. For these cases simple dilutions of skim milk with water answer fairly well, although not nearly so well as some of the more complicated mixtures, as it is impossible with simple skim milk dilutions to secure a high protein in combination with a low sugar. We can, however, secure a fairly low sugar, and after the preliminary purge or starvation, may begin with skimmed milk or water equal parts (boiled five minutes), giving a percentage composition of fat .00, sugar 2.25, protein 1.60. Small amounts should be used at first; a baby who would ordinarily take perhaps six ounces at a feeding, would be given three or four ounces of this mixture. Such a procedure does not apply at all well to the very severe cases, however, and these cases should have hospital treatment if conditions are such that one of the more complicated mixtures cannot be prepared at home. As the baby improves, the amount of the feeding may be gradually increased, and soon a little fat may be added. Lastly, sugar is to be added, in the form of one of the maltose-dextrins preparations. A more satisfactory method of feeding is with skim milk dilutions to which powdered casein has been added. In 1915 I fed a series of cases on this method with very good results. Unfortunately, since the war, the only preparation of powdered casein (Larosan) that was on the market, is not available. A commercial powdered casein preparation is very much needed at the present time, and it would be a great benefit to many babies if one were put upon the market.

2. *"Eiweiss" Milk.*

The famous "eiweiss" milk is probably the most satisfactory food upon which to feed cases of sugar fermentation. It was devised by Finkelstein and Meyer in 1910, and its usefulness, according to them, is based upon the following properties:

1. Low sugar.
2. Dilution of the whey.
3. High casein.
4. Combination of relatively high fat and high casein, thus favoring the production of formed stools.

Since Finkelstein's original contribution, eiweiss milk has been used extensively in all parts of the world, with a great deal of success. Their original directions for preparing it are as follows:

"To one liter of milk one teaspoon of rennet is added. This is then allowed to stand in a

water bath at 100° F. for one hour. It is then placed in a linen bag and the whey strained off by suspending this for one hour. The curd is rubbed once or twice through a fine sieve with the addition of one-half liter of water, and one-half liter of buttermilk." "Eiweiss" milk, then, consists of the curds from a quart of milk, plus a pint of buttermilk, and a pint of water. It has the following composition: fat, 2.5%; sugar, 1.5%; protein, 3.0%; salts, .50%.

Since Finkelstein published his original formula, several modifications have been proposed, all based upon the same principles, however. At first it was thought best to use as low a sugar percentage as possible in eiweiss milk, but it is recognized now that many babies with severe sugar fermentation will die if the sugar is entirely withdrawn, so it is usually best to add sugar up to about 3%. If it is desired to use a nearly fat-free eiweiss milk, fat-free milk may be used instead of whole milk in making the curd. Then the only fat in the mixture is the small amount contained in the buttermilk. The Germans use at the onset very small feedings of eiweiss milk, perhaps giving only one or one and a half ounces at a feeding for the first day or two. In this country the tendency is to use somewhat larger amounts, bearing constantly in mind, however, that the food tolerance of babies with severe sugar fermentation is very meager, and that fatal results may occur from over-feeding. As the baby grows better, and as the stools decrease in frequency the amounts of the feedings may be increased and more sugar may be added. Eiweiss milk is not a permanent food, and a baby should not be kept on it for longer than a few weeks. Eiweiss milk is a tried, proved, and satisfactory food for sugar fermentation, but the difficulties of its proper preparation are considerable, and if a milk laboratory is at hand it is usually better to order the same sort of preparation prepared at the laboratory.

3. *Lactic Acid Milks.*

Natural buttermilk or artificially prepared lactic acid milk are foods which may be used with considerable success. Buttermilk is a food very low in fat, lactic acid milk may or may not be, depending upon what fat percentage the original milk used in its preparation contains. Buttermilk and artificial lactic acid milk are both high protein foods, containing the protein in an easily digestible form (lactate of casein). The sugar is somewhat lower than in ordinary milk, owing to the fact that some of it has been changed into lactic acid. The chief advantages of these preparations are their high protein content, and the fact that they contain living lactic acid bacilli. The intestine in babies with sugar fermentation is swarming with all sorts of harmful organisms, and if it can be flooded with lactic acid organisms in a viable state, the theory is that the growth of the other organisms will be suppressed, and that the harmless lactic acid organisms will supplant them as the intestinal flora. Metchnikoff was the most prominent advocate of these ideas, believing that old age was largely due to putrefaction in the large intestine, and that this could be overcome and the life of the individual prolonged and his general condition greatly improved by the drinking of large quantities of the lactic acid milk preparations. Owing to the prominence of Metchnikoff and the attractiveness of the theory, his views received wide attention, and the drinking of the various lactic acid milk preparations became the fad. This has spread to infant feeding, and it is my belief that the advantages of "buttermilk" feeding have been considerably exaggerated. There is no question but that many cases of sugar fermentation respond well to lactic acid milk, particularly those cases in which the gas bacillus is causing the fermentation, but I believe that the principle of a low sugar and a high protein is, in most cases, much more important than the principle of implanting the lactic acid bacillus in the intestine. If one of these preparations is to be used it is better to have the lactic acid milk prepared at home by means of one of the various liquid cultures on the market than to use ordinary buttermilk, as buttermilk is likely to be rather old when it reaches the consumer, and putrefactive as well as fermentative changes may have occurred in it. I have actually known a specimen of buttermilk in Carolina which was about to be fed to a baby, to be full of well-grown maggots!

Laboratory Feeding. In a large city where there is a milk laboratory, laboratory feeding is the most satisfactory way of feeding babies whose parents can afford it. This is particularly true in cases of sugar fermentation, where, in order to secure the best results, rather complicated mixtures may need to be used. The

milk laboratories have a stock preparation of precipitated casein, and this can be added in any desired amount to any formula, to secure a wide variety of relationships between the protein and the sugar in the mixture. In a severe case of sugar fermentation we might write such a prescription as this: fat 1.00%, sugar (dextri-maltose) up to 2.50%, protein 1.20%, plus precipitated casein up to 3.5%. If the baby has a low fat tolerance a low fat may be used; if it is advisable to use a high fat, as high a fat as desirable may be prescribed, relationships which are not nearly so feasible when the milk is prepared at home. Then again, in laboratory feeding the high protein milk may be run through the homogenizing machine, and a very smooth mixture obtained, a condition which is much desired on account of the ease with which it goes through the nipple, and which cannot be obtained in home modifications. Also, if lactic acid milk is desirable, the mixture (of any prescribed composition) may be treated with the lactic acid bacillus. In short, with laboratory feeding at our command we are much more likely *to feed the individual baby according to his individual needs than if we use home-made eiweiss milk of stock composition;* we save the family an immense amount of trouble, and we feed our baby with a product which we know is uniform in composition.

Water. Fully as important as the feeding is the administration of fluid. *Never let a baby with sugar fermentation get into a "dried out" condition.* In severe diarrhea there is a great loss of water from the body, also in these cases the child is usually taking but little milk, so that he may be putting out a great deal more fluid than he takes in. Again, if there are evidences of acidosis, and if the breathing is of the hyperpneic type, he is probably losing more water through the lungs than would be the case under normal conditions. Evidence is accumulating year by year to show that the toxic symptoms in severe cases of sugar fermentation are largely due to a lack of water. The kidneys are always very inactive in these cases, and it has been recently shown by Schloss that there is a considerable impairment of renal function, and that the blood nitrogen is considerably increased, due to deficient excretion of waste products by the kidney. There is much evidence, according to Schloss, to show that "intestinal intoxication" is very similar to uremia. Also Howland and Marriott have shown that the acidosis in this condition is largely due to defective elimination of acid sodium phosphate by the kidney. The faulty action of the kidney is caused by a dehydration of the tissues brought about by a loss of water in the stools (and possibly expired air) and by the fact that the baby takes little fluid by mouth and is very likely to vomit what he does take. It is, therefore, vital to supply fluid in some way. Water by mouth is the simplest method, and if the baby can retain it, it is best given in this way. A chart, showing the exact intake of fluid, should always be kept in dealing with a severe case of sugar fermentation. If the baby does not take fluid well by mouth it is best to resort to subcutaneous administration of normal saline, and this should be done *early.* It is surprising to see how much fluid a baby will take in this way, how quickly it is absorbed, and how great an improvement in the general condition often follows. If normal saline is given it is best given in the loose tissue of the abdomen or flank, and *not* subpectorally, for the reason that a baby with intoxication has very little strength to spare, and when perhaps 500 grams of water are put upon his chest, and he has to raise this weight with each respiratory movement, it uses up a part of his scanty store of strength. It has also been recommended to administer fluid intravenously through the longitudinal sinus, and intraperitoneally. The fluid is undoubtedly absorbed more quickly by these methods, and the technic is not difficult, but in my personal opinion such methods as these apply very poorly to private practice, and for practical purposes the method of subcutaneous administration is satisfactory. The administration of fluid by the rectum does not work well, as it is very difficult to keep a rectal tube in position, owing to the increased peristalsis and frequency of defecation.

5. *Alkali.* In severe cases of sugar fermentation, when the breathing is of the hyperpneic type, alkali administration is advisable, as acidosis probably exists. Sodium bicarbonate is the best alkali to use, and should be given either by mouth or intravenously. Rectal administration* of soda to babies with diarrhea is not at all satisfactory, for reasons mentioned above. Neither is the subcutaneous use of soda

* In older children with acidosis without diarrhea, rectal administration is the method of choice.

advisable, and it is very irritating to the tissues, and is likely to cause necrosis. If carbon dioxide is bubbled through the solution of soda it is much less irritating (Howland and Marriott—*loc. cit.*) but this procedure is hardly practical for general clinical use.

If soda can be retained by mouth it is best given in this way in fairly large dose; 30 grains every two hours can be given to most babies. Soda should be pushed until the urine becomes alkaline as shown by the simple litmus paper test. If the baby is unable to retain soda by mouth, which is very likely, it must be given intravenously. A 4% solution may be used, and, depending upon the size of the baby, from 75 to 150 cc. of this may be given (Howland and Marriott). In this way a large amount of soda is immediately distributed through the system. In very few babies is it possible to give intravenous injections into an arm vein on account of the small size of the parts, and for this reason the jugular is the best vein to select. In most cases there will be little difficulty in getting into the jugular, but if this is unsuccessful the soda will have to be given through the anterior fontanelle into the superior longitudinal sinus.*

6. *Intestinal Irrigations.* Intestinal irrigations with normal saline *used at the beginning of the attack* may be of considerable value in emptying the colon of toxic products. They have, however, little place in the *later* treatment, and in most cases when used as a daily routine, I believe they do more harm than good, by irritating and disturbing the child. The baby's body is ridding itself of noxious material as fast as it can by watery diarrhea, and there is no point in attempting to wash out the intestine farther, particularly as most of the trouble is in the small intestine, and it is doubtful if this can be reached by intestinal irrigations. In infectious diarrhea (an entirely different condition), where there may be ulceration of the colon and of the ileum, intestinal irrigations with astringents sometimes probably do some good.

7. ***Drugs.*** In most cases of sugar fermentation drugs are of little value; in some cases they are needed. The drugs that have been used may be divided into two classes:

1. Those which are directed against the diarrheal process itself.

2. Those used as stimulants.

1. Often in private practice it is necessary to give some drug on account of the state of mind of the family. They feel that the baby is not being treated correctly if he gets no medicine. Under these conditions *chalk mixture* or *bismuth* may be given. The chalk mixture is mildly alkaline, and may do some good in helping to neutralize the acids which are present in the intestine, although this is accomplished much more efficiently by a suitable regulation of the food supply. Bismuth subcarbonate has been used for years in the treatment of diarrheas of all sorts; it is mildly astringent, and probably slows the intestinal peristalsis somewhat. Its chief disadvantage is that it turns the stools black, and thus makes it difficult to judge of their true character. These two drugs can do no harm, and *may* do some good.

Intestinal antiseptics, such as *salol*, *calomel*, etc., are of no value, and should not be given, as it is quite impossible to sterilize the intestine, or to influence its bacterial flora enough to amount to anything in this way. Here again, the character of the food supply is the most important factor to consider.

Opium in some form, usually as paregoric, has a definite place in the treatment of some cases of sugar fermentation. It should never be given as a routine, but only when the watery diarrhea and tenesmus is so excessive as to exhaust the child. Opium has its dangers, for if the diarrhea is stopped by it, the absorption of toxic material is favored, but in many cases where the child is worn out by excessive straining and tenesmus, its use seems to be the lesser of two evils.

2. Stimulants may be often needed, of which the most valuable are caffein, camphor in oil, adrenalin and brandy. Personally, I prefer caffein citrate, or caffein sodium benzoate, subcutaneously, given in rather large doses. Camphor in oil is also valuable for a failing circulation, but as a general stimulant cannot be compared with caffein. Brandy or whiskey, ten or fifteen drops subcutaneously, is a valuable stimulant for one or two doses, but should not be used continually, as each period of stimulation is followed by a period of depression. Caffein or camphor is, I believe, in most cases superior to alcohol. The subcutaneous injection of one or two minims of a one to one thousand adren-

* For the technique see Dunn, Am. Jour. Dis. Child., Vol. xiv, No. 1, 1917, p. 52.

alin chloride solution may be of service where there is circulatory collapse with very low blood pressure. Its action is, however, only fleeting.

As a brief summary let me say that the two most important things in the treatment of sugar fermentation are proper feeding, and plenty of water, and that most cases may be controlled by these alone, without the use of any other special methods of treatment.

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DENTAL DISEASES IN RELATION TO DISEASES OF THE NOSE AND THROAT.*

By Kurt H. Thoma, D.M.D., Boston,

Lecturer on Oral Histology and Pathology, Harvard University Dental School; Instructor in Dental Anatomy, Harvard Medical School.

Oral diseases are quite frequently closely related to diseases of the nose and throat. They may be the direct cause of the disease (dental infection and maxillary sinusitis) or they may be only a debilitating influence (compressed maxillae and adenoids). Another type of condition presents a still different character. I have in mind referred pain of dental origin, simulating symptoms associated with diseases of the ears and sinuses.

The diagnosis of dental lesions very often calls for most careful and painstaking investigation, as many conditions are not evident in an ordinary dental examination. They are frequently of chronic character, giving no local symptoms, and are not noticed by the patient. As no special complaint is made, such diseases may develop under the very eyes of the dental practitioner, who, as a rule, spends little time in making a thorough examination of the mouth and adjacent parts, being too much taken up with routine work. In an examination of the patients at the Robert Brigham Hospital I found that 72 out of 81 (90%) had dental abscesses,[1] and none was really aware of having trouble with the teeth, although it was necessary to extract 334 teeth from the 72 patients.

The development of the Roentgen diagnosis[2] has greatly facilitated examination of the oral tissues, but such a diagnosis should not be entirely relied upon. The application of temperature and electrical tests, as well as the diagnostic use of local anesthesia, are quite frequently necessary in order to ascertain the exact location and nature of the trouble.

The research work of the last few years has increased our knowledge a great deal, and I am taking the liberty of showing, with the Roentgen pictures accompanying the case reports, slides of microscopic specimens which illustrate typical lesions.

COMPRESSED MAXILLAE AND NASAL OBSTRUCTION.

The connection between malocclusion and nasal disorders has been observed by Hippocrates, who writes, "Those who suffer from headache and running ears have a high-arched palate and irregular teeth." Bottle-feeding and thumb-sucking are the primary causes of the compressed, V-shaped arch and protruding maxillary bones. The lack of lateral development prevents the expansion of the nasal passages and invites the formation of adenoids. This, in turn, causes mouth-breathing, which completes the vicious circle. When treating a case of malocclusion of this type it is important, first, to establish nasal respiration, as without the coöperation of the rhinologist, the dentist's treatment would be futile. On the other hand, it would be entirely useless to hope for permanent relief by removing the nasal obstruction if the jaws did not receive proper orthodontic treatment. It is important to undertake this at an early age, the principal aim being not only to straighten the teeth but to stimulate growth of the bones of the entire face. This can also be furthered by proper diet, which forces the child to masticate, and by special exercises of the muscles of the face.

MAXILLARY SINUSITIS.

Maxillary sinusitis in its various forms is, according to Brophy,[3] in about 75% of the cases due to diseases of the teeth. Chronic abscesses on the upper teeth very frequently

* Paper read before the New England Otological and Laryngological Society.

cause chronic infection of the antra, with polypoid degeneration of the mucous membrane. This condition often develops without the patient's knowledge, and is discovered only in routine examination. If large abscesses occur on the upper molars and bicuspids, sinus disease should always be considered as a possibility, and, on the other hand, the teeth should be roentgenographed in all cases of maxillary sinusitis. The extraction of the diseased teeth, with thorough curettage of the diseased bone, is absolutely necessary as a part of the treatment, and the wound in the alveolar part of the jaws should be freed from sharp, projecting pieces of bone, and closed by means of sutures.

CASE 1. Mr. W. W. C. *History.* Pain in zygomatic and infraorbital regions, and discharge from right nostril. A frontal Roentgen plate shows radiopacity of the right antrum. The cause was ascertained by a film which showed radiolucent areas, indicating abscesses, on two roots of the upper first molar.

Operative Findings. The antrum was found to be filled with polypoid growth, and the bone over the molar was entirely necrosed.

CASE 2. Mr. D. G. *History.* Five weeks before being referred to me the patient began to have rheumatic swelling and pains in the knees. The shoulders were next attacked, and in a short time all the large joints became involved. He took electric baths, but without success. When he came for examination of the mouth, he was walking on crutches and was in great pain, although he had no pain whatever in the face or mouth.

Roentgen Examination. Fig. 9 shows radiolucent areas indicating abscesses on an upper incisor and upper molar. The antrum was suspected and in a Roentgen picture proved to be radiopaque.

Operative Findings. The antrum was opened and found to contain inflammatory granulation tissue, caused by the tooth, which was extracted.

Result of the Operation. Patient first suffered exacerbation, due to the surgical autoinoculation, and had to stay in bed for a few days, not being able to use his joints. He then started to improve, and after seven weeks was entirely rid of all his arthritic symptoms.

CASE 3. Miss A. P. History. Patient was in poor health, and was referred by her dentist for extraction of the left upper first molar. After extraction of the tooth a probe could be passed into the antrum, which was found to contain granulation tissue.

Roentgen Examination. A frontal plate (Figs. 20 and 8) was taken immediately, which showed the antrum on this side to be affected, while on the other side a large periodontal cyst was discovered. This was also caused by abscessed teeth, as diagnosed from another film of the corresponding side. The remarkable thing about this case is that the patient had no symptoms from either of these conditions. She, however, realized a very marked improvement, both locally and in her general health, after the extraction of the teeth and treatment of the antrum.

CASE 4. Mrs. R. H. *History.* Patient complained of neuralgic pain on right side of face.

Roentgen Examination. Shows right upper second bicuspid and molar devitalized. These teeth are in close relation to the antrum.

Operative Findings. After the molar was extracted a small amount of pus came from the antrum.

CASE 5. Miss M. L. *History.* Patient had been in a run-down condition for a considerable length of time. Had been under a physician's care, but did not improve.

Roentgen Examination. Fig. 10 shows indications of many pus pockets and abscesses in the right upper jaw. A frontal plate showed that the antrum was involved.

Result of Operation. After removing the teeth and treating the antrum the patient improved rapidly.

CASE 6. Miss F. E. M. *History.* Patient had been feeling very poorly for several months.

Roentgen Examination showed right upper third molar devitalized. Both molars enter into the maxillary sinus for quite a distance. A frontal plate showed radiopacity of the right antrum.

DISEASES OF THE PHARYNX OF DENTAL ORIGIN.

Chronic Pharyngitis is quite frequently associated with pus discharge from sinuses of chronic tooth abscesses, from pus pockets due to ill-fitting crowns and bridges, or from pyorrhea alveolaris. These conditions can readily be detected in a patient's mouth, although, as a rule, the infection gives very little local disturbance.

Pharyngeal Abscesses are sometimes of dental origin. Partly erupted lower third molars, which have become infected, are usually the cause. The gum near the tooth becomes involved, and from this point the infection spreads to the throat. Difficult deglutition is a common symptom, and trismus of the masseter and internal pterygoid muscle prevents

FIG. 1.—Cross section through a front tooth showing decay on one side and partial filling in of the pulp chamber with secondary dentine, the deposit of which is a protective reaction.

FIG. 2.—Photomicrograph of section through a tooth showing decay which has progressed very near the pulp chamber. The pulp has become infected through the dentinal tubuli and shows a large abscess in the pulp chamber. Note how the nerves are pressed to the side.

FIG. 3.—Photomicrograph showing the root of a tooth with a so-called "blind abscess," or dental granuloma, an inflammatory lesion in the bone which is associated with absorption of the tooth root. Note the rough outline of the part of the tooth which is covered by the granulation tissue.

FIG. 4.—Photomicrograph of a tooth root with a "blind abscess" or dental granuloma. This is another of these chronic inflammatory lesions which has caused a large amount of absorption of the apex of the tooth, involving both the cement and the dentine.

FIG. 5.—Photograph of a skull, showing bone destruction caused by pyorrhea alveolaris. Some of the roots are almost entirely exposed.

FIG. 6.—Photograph of a skull, showing an upper second bicuspid with gold crown. This is a devitalized tooth causing a chronic inflammatory condition of the peridental membrane with involvement of the bone. The specimen shows osteoporosis of the alveolar plate, which, directly over the root, has been entirely absorbed, giving a view of the abscess cavity.

FIG. 7.—Photograph of a skull, showing lesions on both the maxillary and mandibular bones. On the six-year molar the infection occurred through a cavity on the distal surface, the distal root being almost separated from the rest of the tooth. The caries of the bone is quite extensive. The entire outer plate has been destroyed, exposing both the mesial and distal roots. In the upper jaw we find a large amount of rarefied bone beneath and anterior to the zygomatic process. This is due to infection from the second bicuspid and first molar.

FIG. 8.—Roentgen film of Case 3, showing three devitalized molars, from which the antrum was infected.

FIG. 9.—Roentgen film showing the upper first molar, an abscessed tooth which caused the infection of the antrum, cited in Case 2. When taking the picture, a probe which was inserted in the root canal of the tooth entered the antrum.

FIG. 10.—Roentgen film of Case 5, showing many abscesses and pus pockets.

FIG. 11.—Roentgen film showing pus pockets due to pyorrhea alveolaris. The bone between the teeth has been absorbed like that of the skull shown in Figure 5.

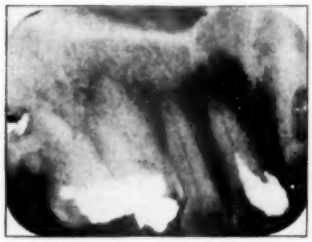


FIG. 12.—Roentgen film showing a blind abscess or dental granuloma on an upper incisor, the root canal of which is only partly filled. This is a condition similar to the one shown in skull of Figure 6.

FIG. 13.—In this Roentgen film, two pus pockets are shown on one tooth. They were caused by the ill-fitting gold crown.

FIG. 14.—Roentgen film of Case 10, showing decay under the filling of the first bicuspid, involving the pulp and causing periapical infection.

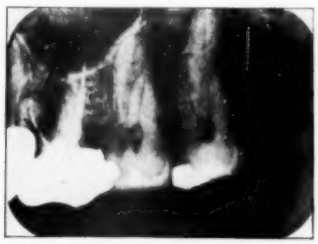


FIG. 15.—Roentgen film of Case 9, showing pulp-stones in the two molars.

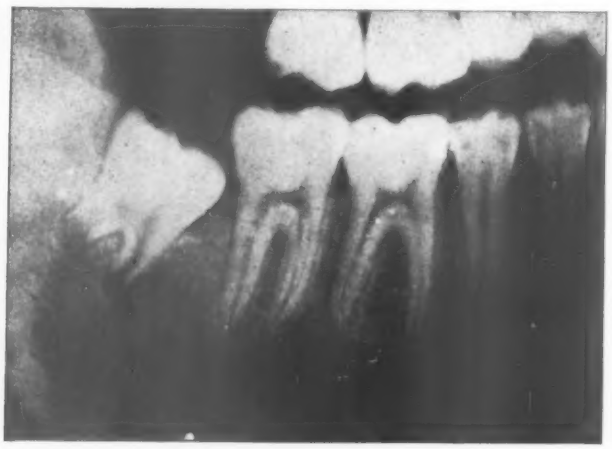
FIG. 16.—Roentgen film of Case 12. The neuralgia in this case was due to an unerupted fourth molar and decay under the filling in the mesial surface of the third molar.

FIG. 17.—Roentgen film of the lower impacted wisdom tooth in Case 7.

FIG. 18.—Roentgen film of Case 14, showing an upper unerupted, impacted third molar and a small cyst at one of the roots of the first molar.

FIG. 19.—Roentgen film showing partly erupted, impacted lower third molar of Case 8.

FIG. 20.—Roentgen plate of Case 3, showing an infected antrum on the left side. The cause of this condition was of dental origin and the teeth are shown in Fig. 8. On the other side a periodontal cyst is shown, which takes up most of the space in the antrum.



FIGS. 21 and 22.—Roentgen films of Case 13. Fig. 21 shows the condition of the lower third molar when the patient was 17 years old. The roots of the tooth are growing towards the inferior dental canal and are causing pressure. The tooth is not in contact with the second molar. Fig. 22 shows the condition when the patient was 19, two years later. Note how the tooth has changed its position.

the patient from opening the mouth. Clinically, the condition may resemble a peritonsilar abscess. Often a great deal of pus gathers and burrows down into the neck. If it arises from a dental source the diagnosis can be made easily by means of the Roentgen ray.

Case 7. Mr. R. B. F. *History.* Had repeated trouble with the left lower wisdom tooth. The last attack was the worst, being accompanied by large swelling, difficulty in swallowing, trismus of the muscles of the jaw, and pus discharged around the tooth. The patient first consulted a laryngologist, as he thought the primary trouble was in the throat.

Roentgen Examination. A Roentgen picture (Fig. 17), however, disclosed an impacted lower third molar with a large cavity in the crown, apparently involving the pulp and causing a large apical abscess.

Case 8. Mr. M. *History.* Patient was unable to open his mouth, and had been suffering a great deal of pain for several days. The throat became inflamed and swallowing painful. Temperature 101° F.

Roentgen Examination revealed a partly erupted third molar (Fig. 19).

Operative Findings. After the mouth was opened under ether, pus was seen to come from the third molar region, the tissues around which were highly inflamed. After the tooth was removed, from 3 to 4 teaspoonfuls of pus were evacuated through the wound from between the gum and the lingual surface of the mandible, by inserting a finger deep into the pharynx.

NEURALGIA DENTALIS.

The extensive area of distribution of the trifacial nerve and its frequent communications with other cranial nerves and the sympathetic system, explains the clinical observations that pain and irritation originating from some dental or oral cause, may be referred to very distant parts of the face and head, including the ear, the eye, the nose, and accessory sinuses. Such pain may be continuous, intermittent or periodic; it may be intense, sharp, throbbing, or dull, and it may be a sensation of obscure, indefinable pressure. The pain quite often simulates symptoms of sinus disease, and still more often is referred to the ear (otalgia dentalis). The tympanic plexus is connected with the second division of the fifth nerve by means of the sphenopalatine, or Meckel's ganglion, via the great superficial petrosal nerve. The third division communicates through the small superficial petrosal nerve and otic ganglion, which also gives a branch to the tensor tympani.

The suffering that goes with these affections is often intense, and if of sufficient duration wears the patient out. The cause is sometimes difficult to ascertain, and calls for a careful investigation, the most frequent origins of the condition being pulp-stones (calcareous nodular formations in the tissue of the dental pulp), chemical or thermal irritation of the pulp, as a rule due to fillings, pulp infection of chronic character, causing an irritation rather than acute inflammation, abscesses formed between the teeth from obstructed pus pockets and unerupted and impacted teeth. Among the last we find, not only third molars, but also cuspids and occasionally the other types and supernumerary teeth. The pressure and pain are due to the mechanical force exerted against the obstruction in the effort to come to the surface, or to pressure absorption, affecting a neighboring tooth. I have recently collected data proving that the pain is due not only to the pressure of the occlusial surface of the tooth against the obstructing tissue, but in many cases is caused by the development of the roots in the opposite direction, where they may encroach upon the inferior dental nerve.

Case 9. Mrs. V. G. L. *History.* Had attacks of neuralgia at intervals on the left side of the face. For three days had been in severe pain, which was especially located in the ear and zygomatic region. Blocking of the posterior superior alveolar nerves with novocain suprarenin synthetic stopped the pain at once.

Roentgen Examination shows pulp-stones in the upper second and third molars (Fig. 15).

Result of Operation. Removal of the pulp and pulp-stones relieved all symptoms.

Case 10. Miss P. *History.* Earache on right side and occasionally what she called "face-ache," on the same side. No pain in teeth.

Roentgen Examination. Fig. 14 shows large radiolucent area indicating decay under filling of right lower second bicuspid; also radiolucent area at apex of tooth. From these findings we may conclude that the pulp is diseased.

Operative Findings. Pulp found to be necrotic.

Case 11. Mrs. M. *History.* Complains of pain over right frontal sinus region, pain in eye, ringing and dull pain in ear.

Roentgen Examination. Revealed two de-

vitalized bicuspids and a cuspid with a large filling near the pulp. Extraction of the bicuspid gave no result, local anesthesia of the cuspid stopped the pain in the ear at once, and extirpation of the pulp cured the pain in the frontal sinus region.

CASE 12. Mrs. H. *History.* Patient had been suffering from neuralgia for six months; had the teeth roentgenographed and examined by two good dentists in New York without finding any cause. Pain extended over entire left side of face (supraorbital, maxillary, mandibular region), as well as toward the neck, back of head and ear. Slight tenderness of cervical lymph glands. Nose, throat and ears examined and found negative.

Roentgen Examination. Revealed a fourth molar (supernumerary) and decay on mesial side of third molar (Fig. 16).

Result of Operation. The day after extraction of the third molar and unerupted fourth molar all pain had disappeared and did not recur.

CASE 13. Mr. F. P. is also a case of particular interest to us. *History.* The patient, 19 years old, suffered for several years with periodical headaches, especially on the right side in the region of the frontal sinuses with indefinite subjective symptoms of pressure in the back of the head. At times the pain disappeared entirely and then a period of suffering followed. Roentgen pictures, showing unerupted wisdom teeth had been taken two years before the patient was presented for examination. These teeth, however, apparently did not exert pressure against those in front and were, for this reason, considered innocent.

Roentgen examination two years after the first plates were taken showed that the teeth had grown into a position which one would not have expected from the positions shown in the first set. (See Figs. 21 and 22.) This is interesting in itself. It was decided to remove all four wisdom teeth, which resulted in complete relief from all symptoms. This demonstrates the fact, already mentioned, that the pain is often caused by the development of the roots of the teeth, which in the first picture of this case are seen to have already reached as far as the inferior alveolar canal.

CASE 14. This is a case where the cause was found in the upper jaw. *History.* Miss R. had periodic headaches in the back of the head for several years. They were quite severe and always on the right side. Sometimes the whole half of the head, including the right ear, would ache.

Roentgen Examination. (Fig. 18.) Films showed infection of the right upper first and second molars with formation of a small cyst; also an unerupted, impacted third molar. The pressure exerted by this tooth caused the well-illustrated tipping of the second molar. A frontal plate of the sinuses was negative. Extraction of the three molars was decided upon, and during the operation the antrum was opened, irrigated and closed with sutures. The treatment relieved the symptoms.

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[2] Thoma, K. H.: Oral Roentgenology. W. M. Leonard, Boston.
[3] Brophy, T. W.: Oral Surgery. Blakiston.

Book Review.

Medical War Manuals, Nos. 5 and 6. By JOHN R. MCDILL, M.D., F.A.C.S. Philadelphia and New York: Lea and Febiger, 1918.

Two medical war manuals, By John R. McDill, have been authorized by the Secretary of War and supervised by the Surgeon-General and the Council of National Defense. Manual No. 5, "Lessons from the Enemy," contains a description of the medico-military service of the German army: its organization, the administrative methods of the Sanitary Service, the military base hospitals, and volunteer nursing and welfare under the Red Cross. It also gives an account of the constructive work being carried on for the rehabilitation of disabled soldiers; it describes the re-education of the war cripple, the orthopedic hospital-schools and workshops, and artificial limbs or prostheses. An information blank for the disabled and a word of encouragement to the sick and wounded soldiers are also included. National and communal war relief work and the social health insurance and hospital systems in peace are mentioned. The book, written by a man who has had the opportunity of rendering medical service in Germany, has been published in order that the United States may have a knowledge of the efficiency of the German methods and may adopt such systems as may be profitable.

Manual No. 6, "Laboratory Methods of the United States Army," has been compiled for war purposes. It contains a collection of formulae and technical methods which may be of service to officers of the medical corps in stationary and field laboratories. It deals with the collection and shipment of specimens and materials, solutions and stains, clinical pathological work, quantitative analytical methods, general and special bacteriological methods, and the sanitary examination of milk, water, and sewage. The methods described in this book are the best which are available at the present time, and may facilitate uniformity of procedure in the army laboratories.

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126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

TRAINING FOR DISABLED SOLDIERS.

THE Red Cross Institute for Crippled and Disabled Men has issued several publications concerning the training of the disabled soldier. The pamphlet issued for April, 1918, by John Culbert Faries, Ph.D., deals with "Training in English Technical Schools for Disabled Soldiers." The importance of utilizing the technical institutions available for the training of disabled soldiers, has been recognized in England. The pamphlet describes the vocational education offered in such highly industrial countries as Lancashire and Yorkshire.

In Lancashire, early in 1917, the representatives of the local war pensions committees, local education authorities, branches of the Red Cross Society, and Lord Roberts' Memorial Workshops, met to formulate a scheme for providing for the care, training, and employment of disabled sailors and soldiers. Various trades were found to offer facilities for instruction, among which were agriculture and horticulture, engineering trades, building and allied trades, coal mining, textile occupations, boot and shoe manufacture, nautical occupation, printing, commercial and clerical occupations, and art industries. In the majority of cases, however, there has not been much call for training, for the demand for labor has made it possible for most of the disabled men to return to their former occupations or find ready employment in other capacities.

The scheme adopted by Yorkshire covers practically the same trades. Training is available in seventeen centers. In the London district, instruction has been offered at the Northampton Polytechnic Institute. The minimum period of training was put at four weeks. The course of training consists of workshop practice in wiring work and the use of simple tools, powerhouse demonstrations, electrical and physical laboratory work, class demonstrations in the elements of electrical engineering and of simple engineering physics, the writing of reports upon the demonstrations and on the laboratory work, and oral examinations at the end of the course. The Battersea Polytechnic has arranged to instruct disabled soldiers and sailors in the following courses: chemical trades, mechanical and electrical engineering, and courses in sanitary inspection, music, art, and cookery. In general, the men attend classes specially arranged to meet their needs. The Birmingham Technical School and the Newport Technical Institute have also undertaken this work. The Ministry of Pensions is to pay the cost of training disabled soldiers or sailors in technical schools.

The courses are necessarily short and intensive, designed to prepare adults in a brief period to become wage-earners. Trade Advisory Committees investigate the kind of instruction desirable, the prospects of permanent employment, and the scale of wages paid in a particular trade.

One of the publications issued for May, 1918, Series 1, No. 9, by Gertrude R. Stein, deals with "Placement Technic in the Employment Work of the Red Cross Institute for Crippled and Disabled Men." To find employment for a cripple involves a great amount of individual attention to each case. The Red Cross Institute has recognized the need of careful, scentific organization in the field of employment, and, as a first step, took over the work started

at Hudson Guild by the Federation of Associations for Cripples.

The experience of the past year has shown that the functions of an employment bureau are two-fold—employment work and investigation of industry. Individual work with applicants is needed, and it is essential that the employment worker differentiate between the placeable and the unplaceable. A handicapped employment bureau cannot be successful unless it is organized according to the most modern and efficient business methods; it must, also, be flexible and adaptable to new ideas. The crippled worker must be trained in order to make a livelihood. The most important factor in effective employment work is a full and intelligent registration of the applicant,—covering the kind of work he wants, the work it would be impossible for him to do, the description of the handicap and a report from the hospital, his family background and work history. Every effort should be made to secure work which is congenial to the applicant.

In order to facilitate the problem of securing work for cripples, the Workmen's Compensation Law must be changed in some way, and prejudice must be overcome. Publicity, answering advertisements, visiting employers, the coöperation of the State Clearing House, and careful follow-up work, are factors needed in successful employment work.

The second division of the work at the Institute Employment Bureau is the industrial survey. The larger industries of New York City are listed and the most suitable have been investigated. Shoes, leather goods, piano action, toys, and cigar factories, offer the most promising fields. Factories and manufacturers' associations have been visited.

The Employment Bureau of the Red Cross Institute for Crippled and Disabled Men aims to obtain congenial work for every crippled man and boy in New York City, and to gather information about industry which will make it possible in the future to place cripples in some scientific way.

Series 1, No. 10, issued for May, 1918, considers the subject, "The Relation of the Short, Intensive Industrial Survey to the Problem of Soldier Re-education." It is written by G. A. Boate, officer in charge of Industrial Surveys of the Invalided Soldiers' Commission in Canada, and describes the methods which are being evolved there. The Industrial Survey work was started by the Military Hospitals Commission in October, 1917, at Montreal. The necessity was soon recognized of enlarging the range of trades in which disabled soldiers could work. Two ways of accomplishing this have been suggested: the first is to purchase additional equipment and give a greater range of courses in the schools; the second is to begin a systematic intensive survey of industries. Standard industrial survey sheets have been formulated which deal with: (1) the names and information from the chief executive of the concern, (2) the occupation and all the elements which enter into it, such as hours, remuneration, training required, and (3) disabilities. Placement officers coöperate with survey officers and see that the men are moved from the schools into proper industries.

Canada realizes that she has not fulfilled her obligation to her disabled men until they can return to civilian life capable of earning a livelihood and of enjoying life. The work has just been started, but already, through the information gained from industrial surveys, about eighteen men have been placed in suitable industrial establishments for the continuation of their training.

"The Vocational School for Disabled Soldiers at Rouen, France," is the subject of Series 1, No. 11, issued by the Red Cross Institute for May 13. France will have to compete industrially with her enemies after the war, and realizes that her greatest difficulty will be shortage of labor supply. Social justice, the interest of the State, and the happiness of the individual demand that her disabled soldiers be made self-supporting.

The Vocational School at Rouen originated with the Departmental Committee on Technical Instruction of the Seine-Inférieure. The school and workshop method of securing vocational training was considered more advantageous than the apprentice system. The schools already in operation at Lyons were visited and the Rouen school was based upon the information acquired there. A building, which had formerly been a school for girls, was given by the city for this purpose. The money for the equipment and running expenses was collected from gifts and various grants, from the government, and from the income received from the sale of articles made in the shops.

It is necessary, before being admitted to the school, that the men be completely cured of their wounds, and be either discharged from the army or waiting for a discharge. Pensions are not curtailed because of increased earning capacity. Both day pupils and boarders are received. Pupils in the manual trades have every day an hour and a half of instruction in elementary school subjects. Thursday afternoons and Sundays, pupils are free to go where they choose. The School has installed workshops for teaching the trades of shoemaking, tailoring, basketry, clock-making, hairdressing, tinsmithing, bookkeeping, accounting, stenography, and typewriting. There is no fixed length of time for apprenticeship; pupils are supposed to stay until they have become good workmen.

The Committee of the Rouen school undertakes to find each man a well-paying position suited to his capacities. The school has had no trouble in placing its pupils.

TRANSMISSION OF TRENCH FEVER.

Some time ago, it was noted in the Journal that American soldiers had volunteered to be bitten by trench lice in order to enable the Medical Corps, by this experiment, to determine whether or not trench fever is transmitted by these lice. Sixty-eight American soldiers risked their health for the sake of science and the Army by submitting themselves for inoculation. Two things were established in the investigation. The first was that trench fever is a germ disease; the second, that it is spread by the trench louse.

The men used in the trench fever experiment were chosen chiefly from field hospitals and ambulance organizations, units commonly designated as non-combatant, and were sent to a hospital behind the British front line in January. The first announcement read in part:

"It is no mean thing that these volunteers did in France. To face illness of weeks, with extreme suffering, requires peculiar valor. The average loss of weight for these men was from 20 to 25 pounds. Incidentally the hospital in which the experiments were carried out was shelled by the Germans in the early part of their March drive. It is believed by the Army Medical Corps that the sacrifice of this group of 68 men will in time lead to the protection of thousands of men from the ravages of trench fever."

An editorial statement published in the *Lancet* gives the following official account of the experiment:

"In the research, which was carried out at a stationary hospital of the B.E.F., six medical officers of the American Reserve Corps (Majors R. P. Strong, H. F. Swift, and E. L. Opie, and Captains W. J. MacNeal, W. Baetjer, and A. M. Pappenheimer) were associated with Lieutenant A. D. Peacock, R.A.M.C. Sixty-eight volunteers from the U. S. Army, all of them in robust health, were examined by physical, bacteriological, and serological tests before the investigation began, and means were taken to prevent them from becoming lousy by accident. In the first series of experiments 34 men were inoculated with blood or some constituent element of it from trench fever cases in a febrile stage, and of these 23 developed typical trench fever—viz., 15 out of 16 who were inoculated with whole blood, 5 out of 5 with clear unfiltered plasma, 3 out of 4 with washed corpuscles, none out of 7 with plasma, serum, or ground corpuscles filtered through Berkefeld candles. The incubation period after blood inoculation varied from 5 to 20 days, being longer with blood taken late in the disease. The first and second days of the attack were shown to be the most infectious. Inoculation was carried as far as the fourth generation of the disease. The second series of experiments dealt with the transmission of infection by the louse. Of 26 men subjected to the attentions of *P. corporis* previously fed on trench fever cases, 12 contracted trench fever, the incubation period varying from 16 to 35 days. Apart from taking longer to develop, the disease produced by the louse appeared identical with that produced by direct inoculation of blood. The work is held by its authors to demonstrate that trench fever is a specific entity and not a form of enteric fever, and has definitely added to our knowledge of the etiology of the disease."

The men who so cheerfully volunteered and risked their health in this cause merit the highest commendation.

AMERICAN MEDICAL ASSOCIATION MEETING.

At the recent annual meeting of the American Medical Association, Dr. Arthur Dean Bevan, of Chicago, president, in his address, urged national prohibition for both military and civilian population, emphasized the necessity of each county in the United States sending a quota of 20% of its medical men into army service, and advocated withdrawal of doctors from association with German scientists

after the war. Dr. Bevan paid special tribute in his address to the work of Surgeon-General Gorgas, and called attention to the fact that the army death rate has been less than 10 per thousand in the mobilization camps. In speaking of the elimination of alcohol, Dr. Bevan is reported to have said:

"In the slow evolution of civilization, many great wrongs became so entrenched that it required centuries of education to extirpate them. Among these great wrongs too long tolerated, none has done more injury to mankind than drink. Now the swiftly moving course of events is writing the death warrant of autocracy and rule by 'divine right,' and science and education should eliminate not only plagues and epidemics, but also the curse of drink from the world."

Other speakers at the meeting were Dr. Mayo and Governor Lowden of Illinois.

The house of delegates of the Association have adopted a resolution urging President Wilson to retain Major-General Gorgas as Surgeon-General despite the fact that he will reach retirement age next October. Another resolution calls upon members to further the conduct of the war by confining their prescribing to products owned and manufactured by citizens of this or the Allied countries, whenever the interests of the patients permit. The proposal of the Association, to give women physicians and surgeons engaged in war work the same military rank as male medical officers, has been approved by Major-General Gorgas.

Dr. Justin Godart, chief of the medical mission sent to the convention from France, brought the following message of hope and confidence to the assembled physicians:

"France knows there is a long, hard struggle ahead before we reach victory; but we have complete confidence that we can hold the line until America arrives in force. Then, for complete victory!"

MEDICAL NOTES.

CONTROL OF VENEREAL DISEASE IN ONTARIO.—The province of Ontario, Canada, has recently adopted legislation for the control of venereal disease.

"In its completed state it provides that if any person is under arrest or convicted of any offence of the Criminal Code of Canada or any Ontario statutes, he or she may be examined and, if infected, may be treated as the medical officers of health may direct; they may be detained or isolated. If the medical officer of health of any municipality has reason to believe that someone is a danger to the community by reason of being infected with venereal disease he may require that person to produce a certificate from a qualified medical man to the effect that he is not infected. If a person fails to do this the medical officer may direct an examination, and if he finds the person infected he has authority to treat the person, detain him, or isolate if necessary. The general principle of the law is, however, away from segregation, and large powers are given to the board of health of the province, in coping with the menace, to make regulations. No person but a duly qualified medical man will be allowed to treat such patients.

WAR NOTES.

LIEUT. GEORGE F. PATTON RECEIVES CROIX DE GUERRE.—Dr. George F. Patton, lieutenant of the Medical Corps from New York, has received the Croix de Guerre for heroism shown during a gas attack. Dr. Patton was with a detachment of a famous regiment when the Germans drenched the position with poison gas. Twenty of the men were overcome. Dr. Patton was safe himself, as he had his mask on at the time. He devoted his most energetic effort to aiding his comrades, but soon found it was impossible to work properly with his mask on. Despite the likelihood of death to follow, he flung off the mask and worked for fifteen minutes, saving the lives of all his patients before he collapsed himself.

BOSTON DOCTORS SENT TO CAMP DEVENS.—Twenty-four officers of the Medical Reserve have been ordered to report to the Commanding General at Camp Devens, for duty with Base Hospital No. 7. This is the Boston City Hospital unit, which was ordered to Camp Devens from Boston for training some months ago. Included among the Medical Reserve officers ordered to duty with Base Hospital No. 7 are several former surgeons of the Boston City Hospital and many graduates from the Harvard Medical School.

Those in active service ordered to this hospital are: Maj. John J. Thomas of Boston, from Fort Leavenworth, Kan.; Capt. Henry W. Jackson, Boston, from Camp Dix; Capt. John H. Lambert, from the Cornell Medical College; Capt. David D. Scannell of Boston, who has been at the Neurological Institute, New York, for a course of training; Capt. Paul Withing-

ton of Boston, from Camp Funston; 1st Lieut. Harold M. Goodwin, 1st Lieut. Robert W. Kispert and 1st Lieut. William R. Ohler, from the medical officers' training camp, Fort Oglethorpe, Ga.; 1st Lieut. Milton J. Longworth, from Hoboken, and 1st Lieut. John H. Reynolds, from Camp Dodge.

In addition, the following of the Medical Reserve Corps have been assigned to active service with the hospital: Maj. Edward H. Nichols, Boston; Capt. Robert J. Kissock, Boston; Capt. Somers Fraser, Boston; Capt. Walter A. Lane, Milton; 1st Lieut. Martin J. English, Dorchester; 1st Lieut. Archibald McK. Fraser, Boston; 1st Lieut. James J. Putnam, Jr., Boston; 1st Lieut. Frank G. Norbury, Boston; 1st Lieut. Carl T. Harris, Boston, and 1st Lieuts. Paul V. Annadown, Ivan R. Burket and Robert C. Cochrane. Also 1st Lieuts. Frank H. Cushman and Harold L. Peacock of the Dental Reserve Corps have been assigned to Base Hospital No. 7.

BOSTON AND MASSACHUSETTS.

WEEK'S DEATH RATE IN BOSTON.—During the week ending June 22, 1918, the number of deaths reported was 189, against 242 last year, with a rate of 12.57, against 16.34 last year. There were 32 deaths under one year of age, against 37 last year.

The number of cases of principal reportable diseases was: diphtheria, 49; scarlet fever, 17; measles, 183; whooping cough, 40; typhoid fever, 3; tuberculosis, 66.

Included in the above were the following cases of non-residents: diphtheria, 14; scarlet fever, 6; measles, 1; tuberculosis, 4.

Total deaths from these diseases were: diphtheria, 2; scarlet fever, 2; measles, 1; whooping cough, 2; tuberculosis, 22.

Included in the above were the following non-residents: diphtheria, 1; scarlet fever, 2; tuberculosis, 2.

NURSES GRADUATED AT LONG ISLAND HOSPITAL.—Twenty-one graduates of the Long Island Hospital Training School for Nurses have received their diplomas.

Brief addresses were made by Lieutenant-Governor Calvin Coolidge, Chairman Thomas A. McQuade of the trustees, Dr. Allan J. McLaughlin, chairman of the State Health Department, Dr. Charles E. Donlon, superintendent of the hospital, and Dr. John Mason Little. Mr. McQuade gave the young women their diplomas for a two years' course.

CHELSEA HEALTH REPORT.—The annual report of the Board of Health of the city of Chelsea has been submitted for the year 1917. The various licenses which have been granted are enumerated. The conservation of child life has been handicapped by lack of money, and it is urged that a sufficient appropriation be granted for the coming year to employ a nurse for this work. The infant death rate has been 3.02 per thousand. Statistics concerning diseases and deaths are given. The reports of the health officer, the milk inspector and bacteriologist, the nurse, and tables showing the results of the school inspection and the mortality statistics for the past year, are included.

The Massachusetts Medical Society.

ANNUAL MEETING OF THE COUNCIL.
JUNE 18, 1918.

THE annual meeting of the Council was held in John Ware Hall, Boston Medical Library, Tuesday, June 18, 1918, at twelve o'clock, noon. The President, Dr. Samuel B. Woodward, was in the chair and the following 116 Councilors present:

BARNSTABLE.
C. W. Milliken, M.N.C.

BERKSHIRE.
E. A. Kennedy, M.N.C.

BRISTOL NORTH.
W. H. Allen, V.P.
W. O. Hewitt.
F. A. Hubbard, M.N.C.

BRISTOL SOUTH.
E. F. Cody.
W. A. Dolan.
R. W. Jackson.

ESSEX NORTH.
F. E. Sweetsir, V.P.
I. J. Clarke, M.N.C.
G. E. Kurth.
E. H. Noyes.

ESSEX SOUTH.
C. H. Bangs.
R. E. Foss.
H. K. Foster.
W. T. Hopkins.
J. F Jordan, M.N.C.
G. M. Kline.
W. G. Phippen.
E. Poirier.
R. E. Stone.

FRANKLIN.
J. W. Cram, M.N.C.

HAMPDEN.
F. H. Allen.
T. S. Bacon, M.N.C.
Helen T. Cleaves.

HAMPSHIRE.
J. G. Hanson.
A. G. Minshall, M.N.C.

MIDDLESEX EAST.
E. S. Jack.
G. N. P. Mead.
F. L. Smalley.

MIDDLESEX NORTH.
W. B. Jackson.
E. G. Livingston.
M. A. Tighe.

MIDDLESEX SOUTH.
G. T. Tuttle, V.P.
M. H. Bailey.
F. E. Bateman.
E. H. Bigelow, C.
Richard Collins.
C. H. Cook.
C. A. Dennett.
John Duff.
G. W. Gay, Ex-P.
A. A. Jackson.
S. R. Lancaster.
Edward Mellus.
C. E. Mongan.
C. F. Painter.
B. H. Peirce.
F. W. Rice.
E. H. Stevens, M.N.C.
A. K. Stone, Treas.
F. R. Stubbs.
G. L. West.
G. W. W. Whiting

NORFOLK.
W. H. Bennett.
D. N. Blakely.
A. N. Broughton.
W. L. Burrage, Sec.
G. W. Clement.
Samuel Crowell.
W. C. Emery.
H. C. Ernst, C.
C. S. Francis.
T. F. Greene.
G. W. Kaan.
Bradford Kent.
T. J. Murphy, M.N.C.
D. T. O'Keefe.
M. V. Pierce.
H. H. Powers.
J. W. Pratt.
S. H. Rubin.
Victor Safford.
R. D. Schmidt.
H. F. R. Watts.

NORFOLK SOUTH.
C. S. Adams.
G. H. Ryder, M.N.C.

PLYMOUTH.
C. E. Lovell.
A. A. MacKeen.
A. E. Paine, M.N.C.
F. G. Wheatley.

SUFFOLK.
J. B. Blake, V.P.
J. L. Ames.
G. W. W. Brewster, M.N.C.

SUFFOLK (*Continued*).
J. A. Cogan.
F. J. Cotton.
E. G. Cutler.
Albert Ehrenfried.
C. M. Green, C.
W. C. Howe.
F. L. Jack.
R. W. Lovett.
J. L. Morse.
Anna G. Richardson.
Stephen Rushmore.
G. G. Sears.
G. C. Smith.
Mary A. Smith.
P. M. Smith.
R. M. Smith.
D. H. Walker.

WORCESTER.
W. L. Johnson, V.P.
F. H. Baker.
W. P. Bowers, Ex-P.
J. C. Généreux.
David Harrower, M.N.C.
E. L. Hunt.
A. G. Hurd.
G. O. Ward.
F. H. Washburn.
C. D. Wheeler.
S. B. Woodward, Pres.

WORCESTER NORTH.
E. L. Fiske, M.N.C.
J. G. Henry.
A. P. Mason.
E. A. Sawyer.

The reading of the records of the last meeting was dispensed with by vote. The names of the Nominating Committee were read by the Secretary by districts and fifteen principals and alternates retired. Dr. Charles M. Green presented the report of the Committee on Membership and Finance as to Membership, and it was accepted and its recommendations adopted.

REPORT OF THE COMMITTEE ON MEMBERSHIP AND FINANCE, AS TO MEMBERSHIP.

The Committee on Membership and Finance makes the following recommendations as to membership:

1. That the following named Fellow be allowed to retire, under the provisions of Chapter I, Section 5, of the by-laws:

Irving Sylvester Fogg of Norwood.

2. That the following named Fellows be allowed to resign, under the provisions of Chapter I, Section 7, of the by-laws:

Rufus Anderson Kingman, of Cambridge (11 Storey Street), with remission of dues to the amount of $5.

Walter Walker Palmer, Presbyterian Hospital, New York, with remission of dues to the amount of $5.

3. That the following named Fellows be allowed to change their district membership, without change of legal residence, under the provisions of Chapter III, Section 3, of the by-laws:

William Allen Brooks, from Middlesex South to Suffolk.
Lewis Webb Hill, from Norfolk to Suffolk.
Eugene Robert Kelley, from Norfolk to Suffolk.
Victor Isaiah Shapira, from Norfolk to Suffolk.
Charles Melville Whitney, from Middlesex South to Suffolk.

4. That the following named Fellows be deprived of the privileges of fellowship, under the provisions of Chapter I, Section 8, of the by-laws:

Camfield W. Chase, of St. Petersburg, Florida.
Mary Gordon Libby, of Newport, New Hampshire.
Freeman Augustus Tower, of Derry, New Hampshire.

For the Committee on Membership and Finance
CHARLES M. GREEN, *Chairman.*

The Chairman of the Committee on Membership and Finance read the vote of the Council February 6, 1918, concerning the payment of the dues of the Fellows who were in the Government service. He explained that the District Societies cannot be forced to pay these dues, and that it is with them a matter of honor. If 700 Fellows are in the service and do not pay their dues, the loss to the Society would be $3500. At present the running expenses of the Society exceed the appropriations. He thought that the District Societies must either give up their divdends, the annual dues must be increased from $5.00 to $6.00, or the Society must face a deficit, and he hoped that the districts would pledge themselves, at such a representative meeting as the annual meeting of the Council, to reimburse the Society. The Treasurer said that only one district had refused to pay the dues of its Fellows in the service. Five have paid and one district has taken no action. Dr. Hopkins of Essex South said that his district had voted to increase the dues. Dr. Rockwell of Hampshire said that a similar action had been taken by his district. Dr. Green explained that the bills for the present year had been sent out already and that in his opinion no action as regards increasing the dues need to be taken at the present time. Dr. Ward of Worcester said that he wanted the matter decided for next year now, and he made the following motion: *Moved*, That the Treasurer be authorized to make out his bills for the annual dues for the year 1919 for the amount of $6.00. The motion was opposed by Dr. Crowell of Norfolk, Dr. Mason of Worcester North and Dr. Cram of Franklin. The motion being put, was carried by a voice vote.

The report of the Committee on Ethics and Discipline was read by the Secretary and accepted. (See Appendix for Report.)

Dr. H. C. Ernst presented the report of the Committee on Medical Education and Medical Diplomas, and it was accepted and placed on file. (See Appendix.)

Dr. Bowers read the report of the Committee on State and National Legislation, and it was accepted with applause. Dr. W. L. Johnson spoke in appreciation of the work Dr. Bowers had done at the State House in advancing desirable legislation and opposing vicious legislation.

Dr. E. H. Bigelow presented the report of the Committee on Public Health and it was accepted. (See Appendix.)

The reports on the petitions of J. T. L. Brennan and J. E. Clark for restoration to the privileges of fellowship were reported upon favorably by the Committees to which they had

been referred, and both reports were accepted by the Council.

The petition of T. F. Carroll for restoration was referred to the following committee:

G. W. Kaan,
G. H. Francis,
B. Blanchard.

At the close of the meeting Dr. Kaan reported for his Committee, recommending the restoration of Dr. Carroll under the usual conditions. The petition of E. R. Gookin for restoration was referred to the following committee:

H. F. R. Watts,
W. C. Emery,
J. E. Hallisey.

At the close of the meeting Dr. Watts reported for his Committee recommending the granting of the petition of Dr. Gookin under the usual conditions.

The Treasurer stated that his working balance in the New England Trust Company was last year (1917) $10,960, and this year (1918) $7,639, with a difference of $3,321. The dinner last year cost nearly $3,000, leaving a balance of $321, so that it is probable that we shall be able to run without a very large deficit this year, provided that the men who are not in service pay their dues to the Society. He read the following letter from Horace C. Hartshorn, Public Accountant:

BOSTON, June 14, 1918.

DR. ARTHUR K. STONE, *Treasurer*,
Massachusetts Medical Society,
Boston, Mass.

Dear sir:

In the report which I made for you as Treasurer of the Massachusetts Medical Society, December 31, 1917, I put on the books the investments and funds which in the past had never been shown on the annual statements rendered by the Treasurer of the Society. Prior to 1917, the Treasurer's report showed simply an analysis of the receipts and disbursements, with the cash on hand at the beginning and end of the year, but no statement of the endowment funds or investments. In order to show the true condition of the Society, I have opened accounts with the different investments and endowment funds.

The difference between the assets and liabilities, December 31, 1917, showed a surplus of $26,932.35. The year 1917 showed that the expenses exceeded the income by $3,727.77, which would show that the surplus January 1, 1917, was $30,660.12. Through mistake in setting up these figures, I showed this surplus on the statement as $23,204.58, but the surplus balance at the end of the year was correctly stated as $26,932.35.

On account of Dr. Buckingham's death, which occurred in December, 1916, the statement of the year 1916 was made up without balancing the books, which would account for the small difference between the surplus shown on that report and the surplus of $30,660.12 on December 31, 1916, as shown by the books.

Yours very truly,
H. C. HARTSHORN.

The Librarian reported verbally that he had performed his duties as in the past.

Dr. George W. Gay presented a report of ten years' experience with the Malpractice Defense Act. (See Appendix.) He moved: That no new cases for defense in suits for alleged malpractice be accepted by the Society until so ordered by the Council. The motion was discussed and put to vote and lost by a rising vote.

The Secretary read the following letter from Dr. E. H. Bradford, Chairman of the Committee on the establishment of a Chair of Military Medicine:

BOSTON, May 15, 1918.

A circular was sent out to the various district boards soliciting subscriptions as directed by the Society. A small amount of money has been received, but this is not as yet sufficient for the establishment of a professorship. Owing to the exigencies of the war, it seems inadvisable to take any further steps to raise money. It is suggested that the amount already contributed be held. The interest of the money can be used, if necessary, to aid in collecting facts as to military medical history, and it is suggested that the President of the Society consider the advisability of appointing a lecturer who may prepare himself, collect the necessary data for a report on the subject, and possibly later for one or more lectures to be given at the Harvard Medical School, open to members of the Society.

E. H. BRADFORD, *Chairman*.

The Treasurer, in reply to questions, announced that only one subscription of $300 had been received thus far. On motion by Dr. Ernst, it was *Voted:* That the one contribution be returned to the donor.

Dr. Albert Evans presented the report of the Committee to Coöperate with the State Board of Labor and Industries, and it was accepted by vote. (See Appendix.)

Dr. C. Morton Smith reported for the Committee on the Control of Venereal Diseases. (See Appendix.)

Dr. A. K. Stone reported progress for the Committee on Health Insurance (see Appendix), and Dr. Broughton reported that the Committee on Workmen's Compensation Act had held no meetings, due to the present situation as regards accident insurance.

The following vacancies in the offices of the general society were filled by the Council under the provisions of Chapter IV, Section 4, of the By-Laws:

BRISTOL NORTH, Commissioner of Trials, C. S. Holden; Censor, T. F. Clark.
ESSEX SOUTH, Supervisor, W. G. Phippen in place of G. E. Tucker.
HAMPDEN, Supervisor, T. S. Bacon in place of G. L. Woods.
WORCESTER NORTH, Commissioner of Trials, F. H. Thompson, Sr.

Dr. A. E. Paine reported for the Nominating Committee that the Committee recommended unanimously the reëlection of the officers of the past year, and nominated in addition for Orator Samuel Crowell of Dorchester. The ballots being distributed and counted, it appeared that 79 ballots had been cast for the following ticket and they were declared elected:

President, Samuel B. Woodward, Worcester; Vice-President, George P. Twitchell, Greenfield; Secretary, Walter L. Burrage, Boston; Treasurer, Arthur K. Stone, Boston; Librarian, Edwin H. Brigham, Brookline; Orator, Samuel Crowell, Dorchester.

The President nominated and the Council appointed these standing committees for the ensuing year:

ON ARRANGEMENTS.
J. L. Huntington, R. H. Miller, C. H. Lawrence, Jr., Donald Macomber, A. W. Reggio, J. B. Swift.

ON PUBLICATIONS AND SCIENTIFIC PAPERS.
E. W. Taylor, R. B. Osgood, F. T. Lord, R. M. Green, A. C. Getchell.

ON MEMBERSHIP AND FINANCE.
C. M. Green, A. Coolidge, Jr., Samuel Crowell, F. W. Taylor, Alfred Worcester.

ON ETHICS AND DISCIPLINE.
J. A. Gage, J. W. Bartol, Henry Jackson, T. J. Robinson, David Cheever.

ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS.
H. C. Ernst, C. F. Painter, H. W. Newhall, J. F. Burnham, C. Frothingham, Jr.

ON STATE AND NATIONAL LEGISLATION.
S. B. Woodward, F. G. Wheatley, W. P. Bowers, E. H. Stevens, A. R. Crandell.

ON PUBLIC HEALTH.
E. H. Bigelow, W. I. Clark, Annie L. Hamilton, E. F. Cody, M. V. Safford.

Adjourned at 1.55 p.m.

WALTER L. BURRAGE,
Secretary.

APPENDIX TO PROCEEDINGS OF THE COUNCIL, JUNE 18, 1918. REPORTS OF COMMITTEES.

REPORT OF THE COMMITTEE ON ETHICS AND DISCIPLINE.

The meetings of the Committee have been necessarily fewer than in former years owing partly to the demands made upon the members for war work, and partly owing to fewer complaints brought to the attention of the Committee. Apparently the more vital interests affecting the Society during the year have distracted the attention of the members from those minor differences of opinion that so often call for adjudication by your Committee.

The relatively few complaints have had to do with the old criticism against advertising and personal differences between fellow practitioners.

One new question involving a principle related to the right of the doctor employed by an accident insurance company assuming care of an injured patient while he was under the immediate care of his own family physician. The Committee held that the rights of the private practitioner should be preserved, as he had assumed personal responsibility for the care of the case, and that the contract doctor should not treat the case until the attending physician had been consulted in the matter.

Some cases awaiting a judicial discussion have been placed on file.

The work of the Committee has been faithfully attended to by the members, with the generous cooperation of our Secretary, and the Society is to be congratulated that so few infractions of the code of ethics have appeared during the year.

For the Committee on Ethics and Discipline,

J. ARTHUR GAGE, *Chairman.*

REPORT OF THE COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS.

On behalf of the Committee on Medical Education and Medical Diplomas, I beg to present the following report:

Exercising its authority to rule upon diplomas from schools not on the accepted list and presented by candidates for fellowship in the Massachusetts Medical Society, two cases have been disposed of effectively during the past year.

I may repeat again the comment that was made in our report of last year that the feeling expressed by certain of the Fellows that the adoption of the vote of June 9, 1914, in accordance with which the Committee has the power, under certain conditions, to recognize a medical degree coming from a not-recognized medical school, would result in the admission of a considerable number of graduates of such schools, has not been realized.

The safeguards thrown about the power thus granted have resulted in affirmative action by the Committee on the applications of but ten individuals since the passing of the vote. Every one of these applicants has been highly recommended by his neighbors, and evidence has been presented in each case showing that he would be a desirable member of the Massachusetts Medical Society.

The possibility of securing action by the Committee as a whole is small. Each member is engaged in service of one sort or another. At least three are in the medical military service, and away from home more or less permanently. The others are likely to be called upon for frequent absences. It is fortunate, therefore, that comparatively little work requiring organized action has occurred during the past year.

A question has been raised by a not-recognized school in another city as to its being admitted to the accepted list of the Massachusetts Medical Society. At the moment, it has not seemed possible to take any action in this matter, in spite of the fact of the presentation of a strong supporting letter from the Bureau of Medical Education and Licensure of the State in which the institution is situated.

The Chairman of your Committee, in response to a request from the President of the Society, appeared at the hearing at the State House on several bills that seemed to be of importance.

The matter of principal interest, however, has seemed to be the meeting of the Council on Medical Education of the American Medical Association, the Federation of State Medical Boards, and the Association of American Medical Colleges.

By far the most important matter brought up at this meeting was the discussion in regard to the methods for supplying the needs of the Medical Department of the Army that ought to be adopted by the various medical schools.

The Chairman of the Council on Medical Education, as part of his opening address, and under the title of "Some Problems in Medical Education Resulting from the War," very strongly urged the speeding up of the graduation of medical students by continuous instruction, summer and winter, in such a way as to condense four years' work into three, and thus graduate the medical student after three years' continuous work.

A vote supporting this recommendation was secured at the meeting of the conference on medical education, largely, your Chairman is convinced, by reason of the belief among the audience that such a procedure was desired by the Surgeon-General.

It is true that the Chairman of the Council on Medical Education, in reading the paper, made the definite statement that parts of the plan suggested were unofficial and his own, but that some parts were supported by the office of the Surgeon-General.

It is always difficult, of course, for an audience to make such differentiation.

Certain steps were taken to secure support for this measure at the meeting of the Association of

American Medical Colleges at which, also, a vote recommending the action suggested was secured through the Chairman of the Committee of the Council on Medical Education.

An attempt was made to guard this vote by inserting the proviso: "If this can be done without lowering the standard of medical education."

This action ignores the experience of the British and Canadian medical schools, as was stated in the discussion.

Desiring to have exact information in this matter, I wrote to friends associated with the medical schools of McGill and Toronto universities. One of them replies from Montreal as follows:

> "Before replying to your letter of the twentieth, I have talked the matter over with Dr. Scone, our Registrar, and thus made sure the information I now give you is correct.
>
> "At first, we tried the 'no vacation' plan, and graduated a class early in January, 1916, which was probably the very poorest class, as a whole, that ever graduated from McGill. Since that time, we have arranged our course, as has, also, Toronto, after consultation with the Military Headquarters' Staff of Ottawa. As a result, we now start our final year on August 15, and graduate them on April 1 following. The other years follow the usual course, starting October 1, and lasting into June following.
>
> "The opinion of our teaching staff is that even the present course is poorer than that given before the outbreak of the war.
>
> "The military authorities, both British and Canadian, are very strongly of the opinion that nothing must be permitted that will lower the standard of medical men entering the army.
>
> "The present arrangement seems to be satisfactory to McGill and Toronto, and perfectly so to the military authorities, with whom our relations are most cordial."

This is so exactly the same sentiment, and the experience and present work of Toronto is so exactly the same as that of McGill, that this letter may be taken as expressing the position of Toronto equally well. In other words, at the conference of the Council on Medical Education, and at the meeting of the Association of American Medical Colleges, a vote was passed favoring action directly opposed to that carried out by our medical neighbors as the result of their experience.

I am glad to say that this method of condensation has met with the disapproval of the Faculty of the Harvard Medical School, and that, unless some greater urgency is brought out than has as yet been the case, there will be no greater speeding up of the graduation of the students at that school than is represented by beginning the fourth year earlier than the usual term.

A second object of interest and of discussion in which your Chairman took an active part was as to what might be done to improve the present medical curriculum to prepare better the medical students for the military duties that are certainly before the majority of them.

As this Council may not be aware—at the present moment all medical students are sworn into the Service, and might be mobilized at once. They are, however, detailed to the different medical schools to pursue their medical education. This in order to supply the need that is pressing, and will become more so in the near future.

In the discussion of this matter, two suggestions were made by me, that came as the result of a conference with the Department Surgeon in the Department of the Northeast, and with the surgeon in charge of infectious diseases, in Washington.

One of these recommendations is that there should be at the close of the curriculum a review laboratory course in which the students should be made reasonably familiar with the most modern laboratory procedures that have been shown to be of such vital importance in the various cantonments and posts.

It has even been suggested that this course should be required of all students so thay they would all have a familiarity with what can be done in the laboratory, although, of course, not all are to be laboratory workers.

A second and important move, as it seems to me, is one that, at present, I have no knowledge is to be carried out. It is the giving to each medical student a definite amount of military training. The need for this was much impressed upon me in an inspection tour which I made in company with the Department Surgeon during the past winter. Much of the difficulty that did exist, certainly much of the confusion, lay in the fact that many of the young officers did not know the necessary routine of their duty. Much of it is a routine of discipline, and of paper work, so called, which must be carried out in order that things may run smoothly.

By far the best time for such instruction as is indicated is the recess between the first and second years of medical study. During this time the medical student has little to occupy himself. He has not reached a sufficient development to make observations in out-patient clinics of value. On the other hand, the discipline and training which he might receive would be of great importance.

H. C. Ernst, *Chairman*.

REPORT OF THE COMMITTEE ON STATE AND NATIONAL LEGISLATION.

The Committee on State and National Legislation presents the following report for the year ending June, 1918:

By reason of joining the Medical Reserve Corps, Dr. J. S. Stone and Dr. W. H. Robey, resigned from the Committee and Dr. Edmund H. Stevens and Dr. Arthur R. Crandell were appointed to fill the vacancies

Early in the year the President entered upon an active campaign to promote support from the auxiliary committee, and secured assurances from 51 members of loyal coöperation with the central body.

The President was led to this course by the long-accepted suspicion that the failure to secure legislative endorsement of measures advocated by the profession was due, in part, to the lack of intensive and coördinate effort by physicians throughout the Commonwealth, as well as the inability of the lay mind always to realize the value of medical advice in state affairs.

The inadequate protective features of the vaccination law had so often been demonstrated in this State that the President felt that the unusual conditions now existing demanded further legislation to protect the people from smallpox, and a thorough canvass of the State was made to ascertain the attitude of influential people toward a plan to strengthen the law. The auxiliary committee enthusiastically responded to the call for assistance, and reported a favorable attitude on the part of a majority of the Legislature.

Every officer in charge of educational institutions throughout the State, not under the protective features of the law, with one exception, endorsed the bill which had been drawn.

The proposed measure provided for compulsory vaccination of all pupils in private, or other schools, not covered by the existing law.

This work involved voluminous correspondence and several interviews in order to make the purpose of the bill clear.

Although this campaign was carefully planned and apparently thoroughly prosecuted, in some mysterious way the bill, which was to have been presented in the House, was taken in charge and presented to the Senate by a member of that body, and was defeated by an overwhelming vote. Why this method

of presenting a House bill to the Senate was adopted has never been explained, and puts a heavy responsibility on the Senator who, without conference with the proponents of this bill, assumed the right to act as sponsor for the measure. This defeat is another evidence of the difficulty sometimes encountered in attempts to secure beneficial laws, and demonstrates that the recommendations of the officers of this Society sometimes fail to secure legislative support. There is, however, reasonable ground for the claim that this campaign has been of value in calling attention to the need of a better law, and in the future your Committee may find effective support, for the almost unanimous endorsement of prominent educators shows that many intelligent people are hopeful of better laws.

The other bills which were carefully considered by your Committee are as follows:

LIST A. APPROVED BY THE COMMITTEE.

HOUSE BILL No. 751.

Relating to licensing of dispensaries. *Enacted.*

HOUSE BILL No. 612.

Relating to incorrigible tuberculosis patients. *Rejected.*

HOUSE BILL No. 559.

Relating to school dentists. *Referred to next General Court.*

HOUSE BILL No. 206.

Relating to increased fee for medical registration. *Enacted.*

HOUSE BILL No. 207.

Relating to fees for certificates for physicians and nurses. *Rejected.*

HOUSE BILL No. 162.

Relating to recommendation of Board of Education for a director of physical education. *Rejected.*

HOUSE BILL No. 92.

Providing for physical examination of convicts. *Referred to next General Court.*

HOUSE BILL No. 210.

Providing for physical examination of prisoners. *Enacted.*

HOUSE BILL No. 212 (Later changed to 1298 and 1299).

Relating to morbidity reports of cases of gonorrhea and syphilis. *Enacted.*

HOUSE BILL No. 1024.

Relative to further supervision of feebleminded persons. (Petition of B. L. Young.) *Next General Court.*

HOUSE BILL No. 1025 (Redrafted as House Bill 1491).

Providing for a special commission to investigate methods of control, custody and treatment of defective delinquents. *Enacted.*

SENATE BILL No. 24.

Providing for the appointment of women on boards of health. *Leave to withdraw.*

SENATE BILL No. 70.

For uniformity in exemption certificates relating to vaccination. *Enacted.*

SENATE BILL No. 1026.

Providing for the study of mental conditions of certain people brought before courts. *Enacted.*

LIST B. OPPOSED BY YOUR COMMITTEE.

HOUSE BILL No. 1137.

Relating to certain regulations for feebleminded. (Petition of Mary Hubby). *Leave to withdraw.*

HOUSE BILL No. 65.

Relating to medical and surgical care of pupils in Public Schools, at public expense. (Introduced by Senator Washburn.) *Next General Court.*

HOUSE BILL No. 294.

For the abolition of trustees of hospitals for consumptives. *Referred to next General Court.*

HOUSE BILL No. 909.

That members of the Board of Registration of Nurses shall not be reappointed. *Leave to withdraw.*

HOUSE BILL No. 1126.

Insuring the purity of vaccine virus. *Leave to withdraw.*

HOUSE BILL No. 642.

Relating to health insurance. (Referred to Committee on Health Insurance.) *Leave to withdraw.*

HOUSE BILL No. 1022.

Providing for an institution of refuge. *Leave to* withdraw.

SENATE BILL No. 13.

Providing that certain physicians be allowed to apply for registration. (Petition by Ex-Governor Bates). (This bill was in the interest of a notorious unlicensed practitioner who had been obliged to suspend practice by reason of restrictive measures enacted the previous year.) *Leave to withdraw.*

In the hearings on the bill for insuring the purity of vaccine virus, Professor Ernst and Dr. Cody gave valuable assistance. This bill is an expression of the purpose, under a misleading title to abolish vaccination.

Emergency action was taken by the President or Secretary whenever it was impracticable to secure a meeting of the Committee on the following measures:

APPROVED.

HOUSE BILL No. 209.

To promote the practice of school hygiene and the health and welfare of school children. *No legislation.*

HOUSE BILL No. 213 (Changed to House Bill 1385).

Relative to prescribing and compounding of drugs for cure or alleviation of venereal diseases. *Defeated.*

HOUSE BILL No. 1023.

To provide for the temporary care of persons suffering from mental diseases, who are in the military or naval service of the United States. *Enacted.*

HOUSE BILL No. 1259.

Relative to prohibiting the conveying of drugs and other articles by and to inmates of public institutions. *Enacted.*

HOUSE BILL No. 1387.

Based on communication of the Governor in response to recommendations of the State Department of Health, relating to the control of venereal diseases, and providing for an appropriation not exceeding $30,000. *Enacted.*

DISAPPROVED.

HOUSE BILL No. 1047.

Relative to a system of non-contributory old age pensions. *Leave to withdraw.*

HOUSE BILL No. 364.

Based on petition of trustees of Massachusetts College of Osteopathy that said college be authorized to grant additional degrees. *No legislation.*

SENATE BILL No. 17.

Petition to abolish the Commission for the Blind.

and that the office of Commissioner for the Blind be established. *No action.*

SENATE BILL No. 71.

Providing for the omission of certain words relating to midwives. *Leave to withdraw.*

SENATE BILL No. 166.

For the prevention of reappointment of members of the Board of Registration in Medicine. *Leave to withdraw.*

SENATE BILL No. 185.

On petition of Katherine Fenelon that legally chartered medical schools be exempt from educational restrictions of the dental law. *Leave to withdraw.*

Another matter may properly be included in this report, for, as a result of sworn affidavits presented to the Attorney-General to the effect that a certain medical college had extorted unwarranted sums of money from some of its students, who also claim that this institution failed to furnish proper medical instruction, the Attorney-General, in his annual report, recommended that the charter granted to this school be revoked.

The Joint Committee on Education conducted a hearing, on the recommendation of the Attorney-General, at which the Attorney-General, the Assistant District Attorney, the Secretary of this Committee, and several students and graduates of the school in question, gave testimony.

Although it seemed to be fairly well demonstrated that this school was open to severe criticism, that, after investigations by the Council on Medical Education of the American Medical Association and others, there had been published statements to the effect that it is not a reputable school, and further, that 39 states in the Union will not accept applications for registration from its graduates, also that its graduates are not accepted in the Medical Corps of the Army or Navy, the Committee before which the report was heard seemed to be favorably impressed with statements made by friends of the school. The supporters of the recommendations of the Attorney-General presented facts. The defendants presented the old arguments in favor of the poor boy and introduced a considerable amount of invective and vituperation which seemed to appeal to the committee. The committee was asked to visit the school, but declined, and dodged the responsibility by referring the matter to the next General Court.

The representatives of this institution have always been in the front ranks of opposition to legislation designed to elevate the standards of medical education in Massachusetts, and the institution now continues to have state support although an abnormally large proportion of its students fail to secure registration.

The experiences of the past year show that there are still people in this Commonwealth who are ready to break down the barriers to incompetent practice, and believe in so-called medical freedom.

These people want low grade medical schools to exist, and are willing to have young people induced to enter upon a course of study which cannot properly prepare them for the practice of medicine, and are not aroused to the responsibility of exercising state protection, both for the people and for credulous students.

Some want the untaught midwives licensed—the charlatan to have the same privileges as the scientific practitioner, and practically all protective measures abolished, and it matters not how illogical a measure may be, it seems to secure support from some members of the Legislature.

These conditions show that The Massachusetts Medical Society must carefully watch legislative activities and try, by all honorable means, to lead the law makers to enact only useful measures.

In all cases where the Committee felt that its influence was needed, either the President of the Society or the Secretary of this Committee appeared at the hearings and stated the attitude of the Society.

WALTER P. BOWERS, *Secretary.*

REPORT OF THE COMMITTEE ON PUBLIC HEALTH.

In attempting to carry on the work outlined in the report of this Committee last June, we were handicapped by the absence in France of two members, Dr. Clark and Dr. Lee. The Committee continued to benefit by the original gift to this Society for public health work. The administration of the gift by the Committee on Public Health being under the direct supervision and subject to the approval of a committee consisting of the President, Secretary and Treasurer of the Massachusetts Medical Society, with the Chairman of the Committee on Membership and Finance and the Chairman of the Committee on Public Health.

A school for health officials was contemplated last year. The rapid progress of preventive medicine is continually bringing new activities and new technical methods into public health work. It is, therefore, highly desirable that the public health officials in each community should have an opportunity once a year to discuss these new procedures, the present work of the various health organizations and their own local problems with experts in the various fields. Even of greater value is the inspiration from contact with men and women working in public health activities who have put away all pride of opinion and reputation, forgetting themselves in their work for the common good. These workers share the heroic spirit of our men in khaki, who are ready to sacrifice all in defense of our homes and liberties; so they fight for healthy homes in Massachusetts.

The additional burden which the war is placing on the civil population has brought a recognition of the importance of public health work never before realized. Public hygiene, the scientific care of the people at home, will be an important factor in the successful conduct of the war and the recovery from its blighting influence.

Mr. E. J. Ingham, C. P. H. agent for the Committee, secured the coöperation of the State Department of Health, the Massachusetts Association of Boards of Health and the United States Public Health Service in holding a four-day session of the convocation and school for public health officials last September. Harvard and Tufts medical schools and the Massachusetts Institute of Technology opened their doors to the sessions of the schools. Leading men and women in health work lectured and held clinics without compensation. Your Committee gratefully acknowledges its obligation to all who contributed to the program, insuring its success. The attendance included health officials from the Berkshires to the Cape.

Many other States hold a similar conference and school for health officials, and a few of them are assisted by the State laws requiring each town to pay the expenses of a delegate. Because of the coöperation of the organizations named above, the leadership which Massachusetts has always maintained in public health work and the large number of public health experts within her borders, our public health school equals or surpasses in quality that of any other State.

It seemed wise to hold the session of the school this year the last week of May. Mr. Ingham left us last fall to act as district health officer in Southern California. Mr. C. E. Turner, instructor in the Massachusetts Institute of Technology, who had made a study of health administration in Maine, was chosen to succeed Mr. Ingham. He now, in turn, leaves us, being appointed Sanitarian by the Shipping Board at Washington, having under his charge 55,000 workmen in the navy yards of the Northeastern District.

The total registration of the second session of the school was 225. Thirty-nine towns and 22 of the 38 cities in Massachusetts were represented—61 cities and towns. Seven other States and two foreign countries also had representatives. The program was carried out exactly as scheduled, every speaker being present, all exercises taking place on time. The representatives of many towns gave warm expression to their appreciation of the helpful meetings. The representative from Mansfield asked particularly that the gratitude of his town be expressed in the official record.

Memorial day evening, Dr. W. W. Peter, Secretary of the Joint Council of Public Health Education in China, who is leading the public health crusade in that country, gave a wonderful lecture. Dr. Heiser, late United States Commissioner of Health in the Philippines, after hearing Dr. Peter, said: "It is the best health talk I ever heard." Dr. Peter goes at once to France for three months, under the Y. M. C. A., in the interest of half a million Chinese laborers. President Wilson, after considering the claims of the Chinese in France, has written Dr. Peter, urging him to return to China and continue his labors for the physical regeneration of that great people.

This year, as last, your Committee is indebted to many organizations and experts in health and sanitary matters for generous coöperation, especially to Professor Sedgwick and the Massachusetts Institute of Technology. Professor Sedgwick gave freely of his time and wide knowledge of public health administration to the Committee. Huntington Hall and the Massachusetts Institute of Technology were generously opened to the sessions of the school. Memorial Day evening the reception and rest rooms were placed at the disposal of the school for a reception to Dr. and Mrs. Peter, Captain Dr. René Sand, member of Belgian Mission on Industrial Management and Lecturer on Social Medicine, University of Brussels, and Passed Assistant Surgeon A. J. Lanza, United States Public Health Service, Washington, D. C.

Governor McCall and Mayor Peters spoke kind and appreciative words on the opening day, bringing the greetings of the State of Massachusetts and of the City of Boston. Our agent, Mr. Turner, had full charge of the school, and to him is due all the credit of the perfect working out of the program.

The success of the second session of the school for health officials was so marked that it seems to be well established as a permanent factor in the health work of the State.

Your Committee feels with increasing force the advantage of towns and groups of towns employing a full time health agent. In school affairs the appointment of a full time superintendent as executive officer for each town or group of towns with an unpaid school board is the well established policy of the State. Is it less important that the health laws should be executed by trained men? The physicians of Massachusetts, with the opportunity they have to mould public opinion, can be of the greatest service in bringing this plan into effect throughout the State, giving medical supervision to every home in the Commonwealth.

The Council on Health and Public Instruction of the American Medical Association, through Dr. Charles E. Chapin, Commissioner of Health of Providence, R. I., published an exhaustive report on State public health work, based on a survey of State boards of health. By that report the Massachusetts Department of Health leads all the other States of the Union. Let us give our State Department of Health hearty support that it may long maintain its present leadership. Let us support it in the difficult work of controlling venereal diseases so gravely menacing our civil and military population.

The Committee would thank the President, members and officers of the Massachusetts Medical Society for counsel and encouragement in their work. We gratefully acknowledge our debt to the generous donors of the fund which has made our work possible.

ENOS H. BIGELOW, *Chairman*,
EDMOND F. CODY,
ANNIE LEE HAMILTON, *Secretary*.

TEN YEARS' EXPERIENCE WITH THE MEDICAL DEFENSE ACT.

The Medical Defense Act of the Massachusetts Medical Society, having for its object the furnishing of counsel to any resident member who may wish such assistance in suits for alleged malpractice, has been in force ten years. A brief report of the work may have some little interest for the Council. Having been responsible for the introduction of the act among the activities of the Society, the President and Secretary have invited me to present a résumé of the service, which is based upon data furnished by the Secretary.

Ninety-four cases of threatened suit for alleged malpractice have been brought to the Secretary for advice and assistance. He has also been consulted in numerous other instances in relation to cases that have not come to any definite action.

Twelve cases have come to trial. Verdict was for defendant in every instance. A new trial was granted in one case. Nineteen cases remain in the hands of our attorney. Some of them are inactive and very likely will never be heard of again. Others may come to trial in the near future. In eleven instances the cases have become outlawed, have defaulted or have been dropped. Applications for defense in fourteen cases of threatened suit are on file with the Secretary. In nineteen cases, suits for alleged malpractice have been threatened, but no applications for defense have thus far been received. In six cases a settlement was brought about through the advice of our officers and attorney. Applications for defense have been refused in three instances as they did not fall within the scope of the act. Two were for alleged libel and one for an over-charge in a bill.

Nine cases were defended by insurance companies, and one by defendant's attorney.

As might be expected, fractures—13 in number—head the list of complaints for alleged malpractice. Ten charges related to confinements, one being a case of "twilight sleep." Six cases had to do with burns by hot water bottle or the x-ray. Four were for alleged unjust commitment to an insane hospital.

Among the various charges for malpractice may be mentioned the following: Unskillful treatment of dandruff, barber's itch, scabies, spinal meningitis, appendicitis, curetting and suspending the uterus, hernia following laparotomy, failure to remove a fishbone from the throat, transmission of scarlet fever, faulty diagnosis of fracture of hip, cancer of uterus and venereal disease, paralysis of arm following caustic treatment of cancer of breast, and another case of palsy following an operation upon the nose, injury to character through alleged error in diagnosis of pregnancy in an unmarried woman, also in the diagnosis of syphilis and again in a case of gonorrhea. However unjust and even frivolous the charge may be, it must be met, as it has a standing in law and in the courts.

The annual expense of this work of the Society for ten years has varied from nothing to $1145. The average annual expense has been $504. An experience of ten years would seem to be sufficient to enable the Council to decide as to the value of this service to its members. It is a species of mutual insurance against suits for alleged malpractice, which are usually unjust and not infrequently pure blackmail, brought to escape paying a just bill or to obtain hush money. As you all know, our medical defense act furnishes counsel to such of our members as may apply for such service in their defense in suits for alleged malpractice. The Society pays nothing on verdicts, nor in the settlement of cases. It is the

nearly universal opinion of the twenty-five State societies that have the law that it tends to discourage fake suits. That it has been a distinct benefit to a considerable number of our members is evident from the Secretary's records.

The Medical Society of the State of New York has had the law in effect twelve years. Their counsel, Mr. James Taylor Lewis, has been in this work 30 years, has tried several hundred cases and has never lost one, even on appeal. So far as is known to the writer, no State medical society has ever repealed its defense act.

Because of the unsettled condition of affairs generally, and in view of the deficit in the Society's treasury, owing largely to the remission of the dues of the enlisted members, it is hereby suggested th no new cases be accepted for defense until ordered by the action of the Council. The cases in hand should, of course, be carried to a finish. It is hoped that the services of the President and Secretary will continue to be extended to members who may be threatened with suits for malpractice. Further than that it would hardly seem prudent for the Society to go under present conditions.

In closing this report, may the writer be permitted to say that the members of this Society can no longer complain that the only asset they receive from their membership is an annual dinner? Aside from the *camaraderie*, which is no trifle, and the standing in the community and in our courts attaching to their membership in the Society, they receive one of the best medical journals in the country and, for ten years, they have had the privilege of a mutual insurance company's service in suits for alleged malpractice. Surely this can hardly be considered a limited or a onesided contract. On the contrary, it would seem to be a fair, if not a generous return for the annual dues and to justify a membership of five thousand rather than one of thirty-six hundred.

GEORGE W. GAY.

REPORT OF THE COMMITTEE TO COÖPERATE WITH THE STATE BOARD OF LABOR AND INDUSTRIES.

Your Committee to coöperate with the State Board of Labor and Industries has the honor to submit herewith its first annual report:

Promptly pursuant to your letters of notification, and accepting an invitation from the Commissioner of Labor, Mr. Edwin Mulready, these members of the Committee: Drs. Wheatley, Howard, Williams, Evans, met at the office of the State Board, No 1, Beacon Street, Boston, on Oct. 30, 1917.

Having been organized, with Dr. Evans, Chairman, and Dr. Williams, Secretary, the Committee was welcomed by Dr. Quessy who said, in effect: That he looked upon this recognition by the Massachusetts Medical Society of the problems of industrial health and disease as a tremendous achievement.

Mr. Mulready announced the intention of the State Board to bear all necessary expenses of the Committee.

Mr. Mulready outlined the field open, especially presenting two problems: Lead poisoning and the question of the advisability of women entering certain occupations to replace men who may go to war.

Dr. Harrington spoke of various factors of ill health among industrial workers. "Anthrax," he said, "is becoming dangerously common among workers with hides, because the skins now being brought to this country, which, before the war, were sent to Europe, come from China and Africa where cattle anthrax is very common." He also referred to gas and fume poisoning to which the workers with aeroplane paint are unnecessarily exposed, owing to the ignorance of both engineers and physicians.

Dr. Evans spoke of the value of correct clinical records both to the physician himself and to the various boards and individuals that had, in the making, medical literature.

Dr. Wheatley spoke of the need for this Committee more completely coöperating with the State government.

Dr. Howard described the work of the Milk and Baby Hygiene Association.

The meeting was adjourned to Nov. 13, 1917.

The second meeting of the Committee was held at 409 Marlborough Street, Boston, all members being present.

Here it was clearly brought out that we were only an advisory body, and that always it should allow the initiative to be taken by the Board of Labor and Industries.

Dr. Howard said, "The Committee should, however, signify its willingness to consider all questions that the Board might wish to offer."

Voted: That the following letter be sent to the State Board of Labor and Industries through its executive officer, the Commissioner, Mr. Edwin Mulready:

Dear sir:

The Committee of The Massachusetts Medical Society to coöperate with the State Board of Labor and Industries, desires to notify the Board of its willingness to consider all such problems as the Board may wish to refer to it, and, as the Commissioner has already suggested two subjects, namely, How to interest physicians to report cases of industrial lead poisoning, and the question of women entering certain industries in order to replace men who have entered military service, the Committee instructs the Secretary to request a list of the industries in which it is proposed that women may so replace men, in order that it may consider the probable effects of such occupation on the health of women.

JOHN T. WILLIAMS, *Secretary.*

Numerous other meetings were all well attended. At one meeting of your Committee, the device of reaching the Fellows through the District Medical Societies was hit upon, and with happy results. Two industrial health conferences have been held, one at the invitation of the Worcester North District Medical Society, the second at the invitation of the Bristol South District Medical Society; the first at Fitchburg, the second at New Bedford, and a third is now in contemplation to be held in Greenfield.

These conferences are fully reported and, later, are to be issued by the State Board of Labor and Industries in book form, and will be available to all who may wish to possess them. The general announcement reads:

"The State Board of Labor and Industries, with a Coöperating Committee of the Massachusetts Medical Society, is inaugurating a State-wide effort to mobilize allied interests in developing positive means to make and maintain, healthy and strong, the internal life of this Commonwealth, especially through the vital concerns—fundamental to its very existence in peace and to its larger life in war—of industrial activities."

ALBERT EVANS, *Chairman,*
FRANK G. WHEATLEY,
ARTHUR A. HOWARD,
HARRY LINENTHAL,
JOHN T. WILLIAMS, *Secretary.*

REPORT OF THE COMMITTEE ON THE CONTROL OF VENEREAL DISEASES.

Your Committee has held several meetings and has conferred with representatives of the State Health Department and with Lieut. McKee of the National Army, in charge of the venereal problem in this vicinity. The New York City Health Department has been visited, and considerable material, facts and literature have been collected.

Our desire has been to supplement and not to duplicate work already under way in the State.

The Health Department plans to control the venereal problem through four channels:

1. Reporting.
   This should have the support of the entire medical profession.
2. Free arsphenamine.
   This will be welcomed.
3. Repression of prostitution.
   Which should receive our endorsement.
4. Education.
   In this the support of the members of our Society will not be wanting.

The State is planning to establish about fifteen venereal clinics throughout the State. These clinics will be the distributing stations for arsphenamine, and will also supply free means for exact diagnosis. It is hoped, moreover, that these clinics will act as consultants, and will gladly furnish all possible help for that locality. Dr. Baker, from his experience in the Wassermann laboratory in Worcester is convinced of the great educational value of local Wassermann laboratories where the general practitioners can be encouraged to bring in their specimens for examination, and can talk over their cases with the serologist. In this way, routine Wassermann tests become a habit with many physicians, as a result of their broader viewpoint.

It seems to your Committee that the members of our Society can be of much help in supporting these clinics. There is great need of prompt diagnosis and treatment, and it is hoped that these clinics will have a stimulating effect along this line.

There are still many hospitals in the State whose doors are closed to patients with venereal disease. We believe that the members of the Massachusetts Medical Society can render effective service by their influence with local hospitals to provide a few beds for the care of syphilis or gonorrhea during the contagious period. Such action would naturally increase the number of beds available for the care of such cases. Even the allotment of *one* bed would furnish sufficient hospital accommodations to allow from 15 to 24 infectious syphilitics annually to be returned to the community *non-infectious*.

We are soon to have a list of all hospitals in the State, and then we shall find out how many will admit venereal disease, and in what number; and, if not admitting, *why not*.

Dr. Hitchcock, representing the Health Commissioner, outlined the Board's plan of a propaganda of publicity through articles in the lay press—these to be edited by a practical newspaper man, and to consist of articles on cancer, tuberculosis, child welfare, etc.; and Dr. Hitchcock suggested that our Committee might be allowed to furnish short articles on syphilis and gonorrhea. This plan, while it would entail some expense, would stimulate greater activity on the part of the medical profession as the result of an awakened public opinion.

Your Committee also favors a series of short, live articles in the BOSTON MEDICAL AND SURGICAL JOURNAL, perhaps every other week, on some pertinent phase of the venereal problem.

It was suggested that something might be accomplished through the local medical societies and clubs by urging that one meeting, at least, might be given to the consideration of venereal diseases.

Short talks during the noon hour to employees of manufacturing and other establishments should be arranged for *mixed* audiences. "For men only" or "women only" should not apply to syphilis and gonorrhea, and tends to cloud, rather than to clarify, the situation.

From the army and navy standpoint syphilis is practically *all* of venereal origin—which is far from true with the civil population, and I feel that again to classify syphilis as a venereal disease is a side step, if not a back step, as it at once undoes all that we have been trying for years to accomplish, *viz.*, the consideration of syphilis as a chronic contagious disease. In civil life about *half* the cases are innocent infections, and should, therefore, be free from the stigma of "venereal disease."

To carry out some of the recommendations of your Committee a certain amount of money will be needed, particularly if the suggestion of newspaper articles is adopted.

C. MORTON SMITH, *Chairman.*

REPORT OF THE COMMITTEE ON HEALTH INSURANCE.

The Recess Committee of the Legislature which considered social insurance made a very comprehensive report advocating greater extension of public health service affecting all laborers, the payment of living wages, and the extension of supervision of labor in the various plants of the State.

No special insurance legislation was reported as desirable.

In spite of this, various bills for old age pensions and health insurance were introduced. These were considered in committee and reported as "referred to the next General Court." This report was accepted by the Legislature. So there has been no active work on the part of the Committee.

A. K. STONE, *Chairman.*

Correspondence.

IOWA STATE MEDICAL SOCIETY: A CORRECTION.

Des Moines, Iowa, June 17, 1918.

Mr. Editor:

Our attention has been called to an error in the officiary of the Iowa State Medical Society as it appeared in your publication following our annual session last month.

If not asking too much, and consistent with your policy, would you be so good as to make the necessary correction, that proper credit may be had.

Our 1918-1919 officers are: President, Dr. Max E. Witte, Clarinda; President-elect, Dr. Will L. Allen, Davenport; First Vice-President, Dr. William A. Rohlf, Waverly; Second Vice-President, Dr. Evan S. Evans, Grinnell; Secretary, Dr. Tom B. Throckmorton, Des Moines; Treasurer, Dr. Thomas S. Duhigg, Des Moines; Editor, Dr. D. S. Fairchild, Clinton.

Thanking you, we are, very truly yours,

Iowa State Medical Society,
TOM B. THROCKMORTON, *Secretary.*

MEN WANTED FOR HOSPITAL CORPS, UNITED STATES NAVAL RESERVE FORCE.

Men who have had experience in nursing and pharmacy are wanted immediately for the Hospital Corps of the United States Naval Reserve Force.

Applicants must be American citizens between the ages of 18 and 25, and must apply in person to the District Medical Aide, Room 1211 Little Building, Boston, Mass.

As these men are to be trained in the First Naval District, it is necessary that they have a knowledge of nursing and pharmacy. They will be assigned to hospitals in this district and will be trained under the supervision of some of the best physicians in the Naval Service.

The pay varies from $35.90 per month for hospital apprentices, second class, to $72.00 per month for Chief Pharmacists' Mate. In addition, there is an allowance up to $50.00 per month for dependents, according to relationship and number. There is also insurance at low cost in any amount up to $10,000. This insurance is good after the war. There are many other inducements such as retainer pay, retirement bonus, allowance of $60.00 worth of clothing upon entering, free medical attendance, opportunity to travel and a chance to serve the country.

If of the draft age, the applicant must bring with him a release from his local board. If over 18 years and not yet registered in the draft, he must bring a birth certificate.